



# South Florida Water Management District

3301 Gun Club Road, West Palm Beach, Florida 33406 • (561) 686-8800 • FL WATS 1-800-432-2045  
TDD (561) 697-2574

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## MEMORANDUM

## EVERGLADES REGULATION

**TO:** SFWMD/Seminole Agreement Working Group

**THROUGH:** Leslie A. Wedderburn, Director, Water Resources Evaluation Department

Linda J. Lindstrom, Director, Resource Assessment Division, WRE

**FROM:** Tim Bechtel, Sr. Supervising Environmental Scientist,  
Resource Assessment Division, WRE

Cheol Mo, Sr. Environmental Scientist,  
Resource Assessment Division, WRE

**DATE:** March 8, 1999

**SUBJECT:** Final Fourth Semiannual Progress Report - May 1, 1998 to October 30, 1998

The enclosed fourth semiannual progress report has been prepared in accordance with the SFWMD/Seminole Tribe Agreement, Paragraph A.3. The report presents the data collected and the results obtained from the total phosphorus load calculations for the period May 1, 1998 through October 30, 1998.

Please contact Tim Bechtel if you have any questions or suggestions regarding this final report.

Attachment  
CM/TB/dwp

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Mailing Address: P.O. Box 24680, West Palm Beach, FL 33416-4680

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**Fourth Semiannual Progress Report**

**Total Phosphorus Load Calculations for Sites  
Stipulated in the SFWMD/Seminole Tribe Agreement**

**For the Period of May 1, 1998 through October 31, 1998**

**By**

**Timothy J. Bechtel, Ph.D., Sr. Supv. Environmental Scientist  
and  
Cheol Mo, Ph.D., Sr. Environmental Scientist**

**March 8, 1999**

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**Resource Assessment Division  
Water Resources Evaluation Department  
South Florida Water Management District  
West Palm Beach, Florida**

**Submitted to**

**SFWMD/ Seminole Tribe Agreement Working Group**

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## Introduction

The Agreement between the South Florida Water Management District (the District) and the Seminole Tribe of Florida (the Seminole Tribe), executed on January 17, 1996, requires periodic monitoring of the quality of surface water entering, originating on and leaving the Big Cypress Seminole Indian Reservation (the Reservation) to ensure compliance with applicable water quality standards imposed by law and that the overall surface water quality within the Reservation is not adversely impacted.

Pursuant to the Agreement, the District, with the cooperation of the Seminole Tribe, initiated a water quality monitoring program in June of 1996. To help the SFWMD/Seminole Agreement Working Group track the results and progress of this monitoring effort, the District prepares a semiannual report that summarizes and analyzes the water quality and flow data collected since the implementation of the program.

The fourth semiannual progress report covers the wet season of 1998. This report presents the results of TP load calculations for the period of May 1, 1998, through October 31, 1998, for the following six sites the District monitors: North Feeder Canal (NFEED), West Feeder Canal (WWEIR), S190 Spillway (S190), L3 Canal Sampling Station (L3BRS/USL3BRS), U.S. Sugar Outfall (USSO) from the C-139 Annex, and the S140 Pump Station Complex (S140). The summary of the USGS flow data for L28U, L28IN and L28IS from May 1, 1998, through September 30, 1998, is also presented in this report and comparisons of the flow measured at the L28I and L28U canal sites to the flows measured by the District at upstream sites are presented.

The United States Geological Survey (USGS) has been collecting the flow data at the L28IN, L28IS and L28U sites since March 1, 1997. The Seminole Tribe began their water quality and nutrient data collection at L28 Interceptor Canal North (L28IN) and L28 Canal Upstream (L28U) sites on August 21, 1997. However, the quality control/quality assurance procedures for the sites are under review and the nutrient data were not ready for this report. Water quality data for the Miccosukee Tribe site, L28 Interceptor Canal South (L28IS) are presented as an addendum to this report because the data were not available at the time the draft report was prepared.

All water quality data collected from May 1, 1998, through October 31, 1998, at the six sites monitored by the District are summarized in Table 5 through Table 10. Each water quality parameter measured at the six sites was compared with the Class III Standard (Florida Administrative Code 62-302.530, Criteria for Surface Water Quality Classifications) and the Sub-Class 2-B Criteria (Seminole Tribe of Florida, Water Quality Standards for the Big Cypress Indian Reservation) to see if any criterion had been exceeded.

One copper and two zinc measurements were above the detection limit but did not exceed the Class III Criteria. Only one iron measurement exceeded the Class III Criterion (Table 11). The standards for the trace metals, cadmium, copper, lead, and zinc are a function of water hardness. Hardness is calculated using the magnesium and calcium concentrations of the same water sample used to measure the trace metals (Standard Method 19<sup>th</sup> Ed., 2340 B., p2-36, 1995). Except for periodic low dissolved oxygen

(D.O.) concentrations at some sites, and an iron measurement at L3BRS on October 8, 1998, no Class III Criteria were exceeded during this reporting period.

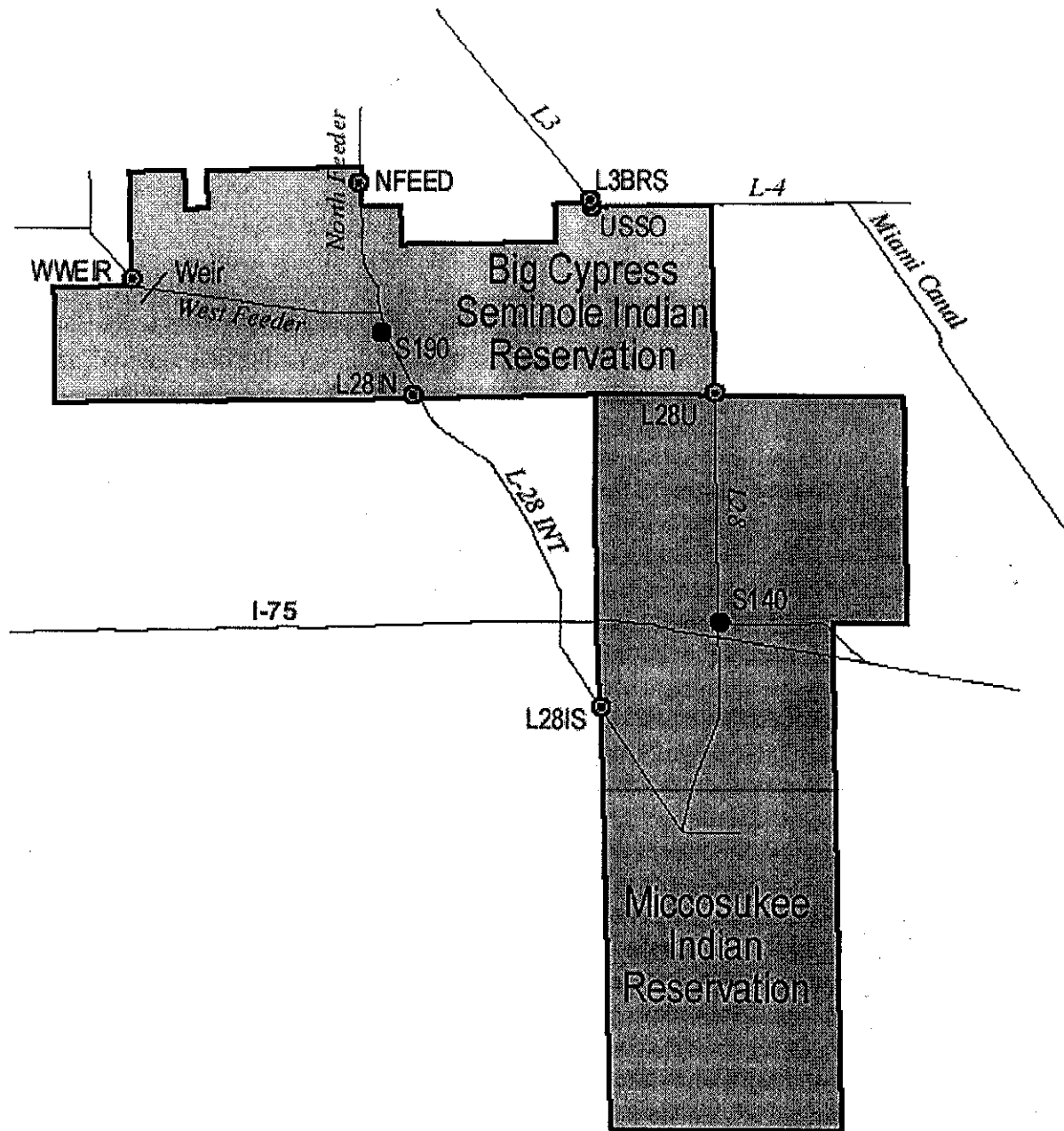
Water quality monitoring at WFEED, the sampling station located upstream of the weir in the West Feeder Canal, was discontinued as of August 27, 1998, because it was concluded that the samples at the weir sampling site, WWEIR, provide better representative water quality data for the West Feeder Canal.

## Methods

Figure 1 is a location map showing the water quality sampling and flow measurement sites that were established for the Agreement. The NFEED, WWEIR, USSO, L3BRS/USL3BRS, S190 and S140 sites are maintained and sampled by the District. The NFEED, USSO, and L3BRS/USL3BRS sites are equipped with ultrasonic velocity meters (UVMs) to measure flow and auto-samplers to collect flow proportional water quality samples. The WWEIR site uses a weir equation to calculate flow and trigger an auto-sampler. Grab samples are also collected at the NFEED, WWEIR, USSO, L3BRS/USL3BRS sites to supplement the auto-sampler data. Flow through S190 and S140 is calculated using structure-specific equations. At both S190 and S140 water quality data are collected by grab sampling procedures. The sites at L28IN and L28U are equipped with UVMs installed and maintained by the USGS and auto-samplers supplied and operated by the Seminole Tribe. The Miccosukee Tribe has a monitoring site located at L28IS, which is equipped with a UVM supplied by the USGS and a Tribe-owned auto-sampler.

Graphs for the six sites monitored by the District summarizing daily mean flows expressed in cubic feet per second (cfs), TP concentrations in parts per billion (ppb), and resulting daily TP loads in kilograms (kg) are presented in Figure 2 through Figure 7. The graphs summarizing the daily mean flows, expressed in cubic feet per second (cfs), for the three sites monitored by the U.S.G.S. are presented in Figure 8 through Figure 10. Note that the same scales for the flows, TP concentrations, and TP loads are used in all nine figures, except for the TP load at L3BRS, to make comparisons easy.

Figure 1: SFWMD/Seminole Agreement  
Water Quality and Flow Sampling Sites



- Grab samples and flow through structures
- ⊙ Autosamplers and flows from UVMS



## Results of Phosphorus Load Calculations

The results of the water flow analyses and the computed total phosphorus loads for the period of May 1, 1998, through October 31, 1998, at sites WWEIR, NFEED, USSO, L3BRS/USL3BRS, S190, and S140 are presented in Tables 1. These data were used to create the total phosphorus load graphs for the sites. The results of the water flow analyses for the period of May 1, 1998, through September 30, 1998, at sites L28IN, L28IS, and L28U are also presented in Table 2. Because the water quality data for L28IN, L28IS, and L28U are not available for this period, only flow data are reported. Table 3 summarizes the monthly flows, total phosphorus loads, and total phosphorus flow-weighted mean concentrations at the District's six sites and the monthly flows for the other three sites.

There are usually heavy rainfalls during the summer months followed by relatively dry periods during winter months in South Florida. The amount of TP load is mainly governed by the amount of rainfall and consequential flows. The TP loads in the reporting area had been following the similar pattern, peaking during the wet season and remaining low during the dry season. However, there have been exceptionally heavy rainfalls and, thus, heavy flows at canals during the last dry season (October, 1997 through April, 1998) followed by an exceptionally dry "wet season." There was exceptionally low or no flow until mid July throughout the area. Only September and October showed substantial flow and TP loads during the reporting period. The total flow at L3BRS was the highest among the nine sites. It was about a third higher than the total flow at S190, the site with the second biggest flow. The TP concentrations at L3BRS were much higher than the TP concentrations at other sites and, consequently, the TP load at L3BRS was the biggest among the six sites, whose TP concentrations were reported. The TP load at L3BRS was almost four times larger than the TP load at S190, the site with the second biggest TP load.

### L3BRS

Flow at L3BRS had been very low until mid July (1, 1 and 7 thousand acre-feet in May, June and July, respectively) but increased to 28 thousand acre-feet in September. The total flow for May 1, 1998, through October 31, 1998, was 82 thousand acre-feet, the largest of the all nine sites. The TP load peaked at 6,778 kg in September 1998. The sum of the TP loads at L3BRS in September and October was 11,502 kg and that is close to four times larger than the TP load for the entire period at WWEIR and NFEED. The total load for the entire reporting period was 14,350 kg, the largest among the six sites. The associated flow-weighted mean concentration of the total phosphorus data collected by the auto-sampler was 175 ppb, the highest among the six sites. The results for L3BRS are presented in Figure 2.

### USSO

The total flow for the period was 18 thousand acre-feet, much lower than that at L3BRS. The total phosphorus load for the reporting periods calculated by the auto-sampler composite TP concentrations was 2,111 kg (Figure 3). The flow-weighted mean concentration of the auto-sampler data collected for the period was 113 ppb.

#### L28U

The flow data for L28U from May 1, 1998 to September 31, 1998 are presented in Figure 4. Total flow was for the period (May 1 to September 31) was 39 thousand acre-feet. This was more than twice of 15 thousand acre-feet at USSO for the same period.

#### S140

The total phosphorus load calculated for S140 for the period of May 1, 1998, through October 31, 1998, was 3,761 kg. During the 184 day period, 81 days had no positive flow. The total flow for the period was 66 thousand acre-feet. For the period of May 1 through September 30, total flow was 50 thousand acre-feet, which is 11 thousand acre-feet more than the total flow at L28U.

The load estimate is based on the grab samples collected during flow events (Figure 5). The associated flow-weighted mean concentration of total phosphorus was 52 ppb, considerably lower than that of USSO (145 ppb). The low TP concentration at S140 compared to the TP concentration at USSO and the high flow volume compared to the total flow at L28U indicates that (1) S140 may get much of the water from south, and (2) the TP concentration of the water from the south is very low.

#### WWEIR

There had been no flow in the West Feeder Canal from late April until mid-July and, after that, the flow was low until late August. The flow peaked in late September. There were 78 days with no flow during the reporting period of May 1, 1998, through October 31, 1998 (total 184 days).

The TP load discharged from the West Feeder Canal, calculated using the auto-sampler TP data at WWEIR, from May 1, 1998 through October 31, 1998 was 1,042 kg (Figure 6). The flow-weighted mean concentration of total phosphorus was 62 ppb. The total phosphorus load calculated for S190 for the reporting period was 6,988 kg with total flow of 17 thousand acre-feet.

#### NFEED

There had been no substantial flow in the North Feeder Canal until early August but the flow data showed that there were very small but continuous upward (negative) and downward (positive) flow of the water flow during that period. At times of discharge through S190 both positive and negative flows can occur at the NFEED UVM site. However, the oscillating velocities measured by the UVM were probably caused by a circulation pattern that translated into positive and negative flows when there was no net discharge past the UVM site because the gates at S190 were closed. Both positive and negative flows and the associated positive and negative total phosphorus loads are reported in this report.

The flow-weighted mean concentration of total phosphorus data collected by the auto-sampler was 87 ppb. For the period, total positive flow was 7 thousand acre-feet and TP load was 730 kg (Figure 7). Total negative flow was 2 thousand acre-feet and the reverse TP load associated with that negative flow was 170 kg. During the last reporting period, May 1, 1997, through April 30, 1998, the TP load at NFEED was much higher than that

at WWEIR despite the total flow was much smaller. The TP concentration at NFEED had been much higher (146 ppb) than that at WWEIR (32 ppb). For the present reporting period of May 1, 1998, through October 31, 1998, the TP load at NFEED was lower than that at WWEIR. The total flow at North Feeder Canal was about two fifth of the total flow at West Feeder Canal and the difference in the TP concentrations for the two sites was not as big as it had been for the last reporting period.

#### S190

The gates at S190 were closed except for occasional brief maintenance openings until early August. The load estimate is based on the grab samples collected during flow events (Figure 8). The flow-weighted mean TP concentration at S190, which is fed by West Feeder Canal and North Feeder Canal, was 63 ppb, which is closer to WWEIR value than to NFEED value. The total phosphorus load calculated for S190 for the reporting period was 1,355 kg. The total flow was 22 thousand acre-feet. Both the TP load and the total flow at S190 were very comparable to the sum of the North and West Feeder Canals.

#### L28IN

The daily flow at L28IN for the period of May 1, 1998, through September 30, 1998, is presented in Figure 9. Total flow for the period was 16 thousand acre-feet. For the last reporting period, the total flow at L28IN was about 20 thousand acre-feet lower than the total flow at S190 or L28IS. For the present reporting period, the total flow at L28IN was about 6 thousand acre-feet lower than the total flow at S190 and was about 4 thousand acre-feet lower than the total flow at L28IS. There was almost 7 thousand acre-feet of negative (reverse) flow for the present period.

#### L28IS

Water quality data were not available for this report. Total flow at L28IS for the period of May 1, 1998, through September 30, 1998, was 20 thousand acre-feet, comparable to the total flow at S190 (Figure10).

Figure 2. L3BRS TP Load, Flow and TP Concentration

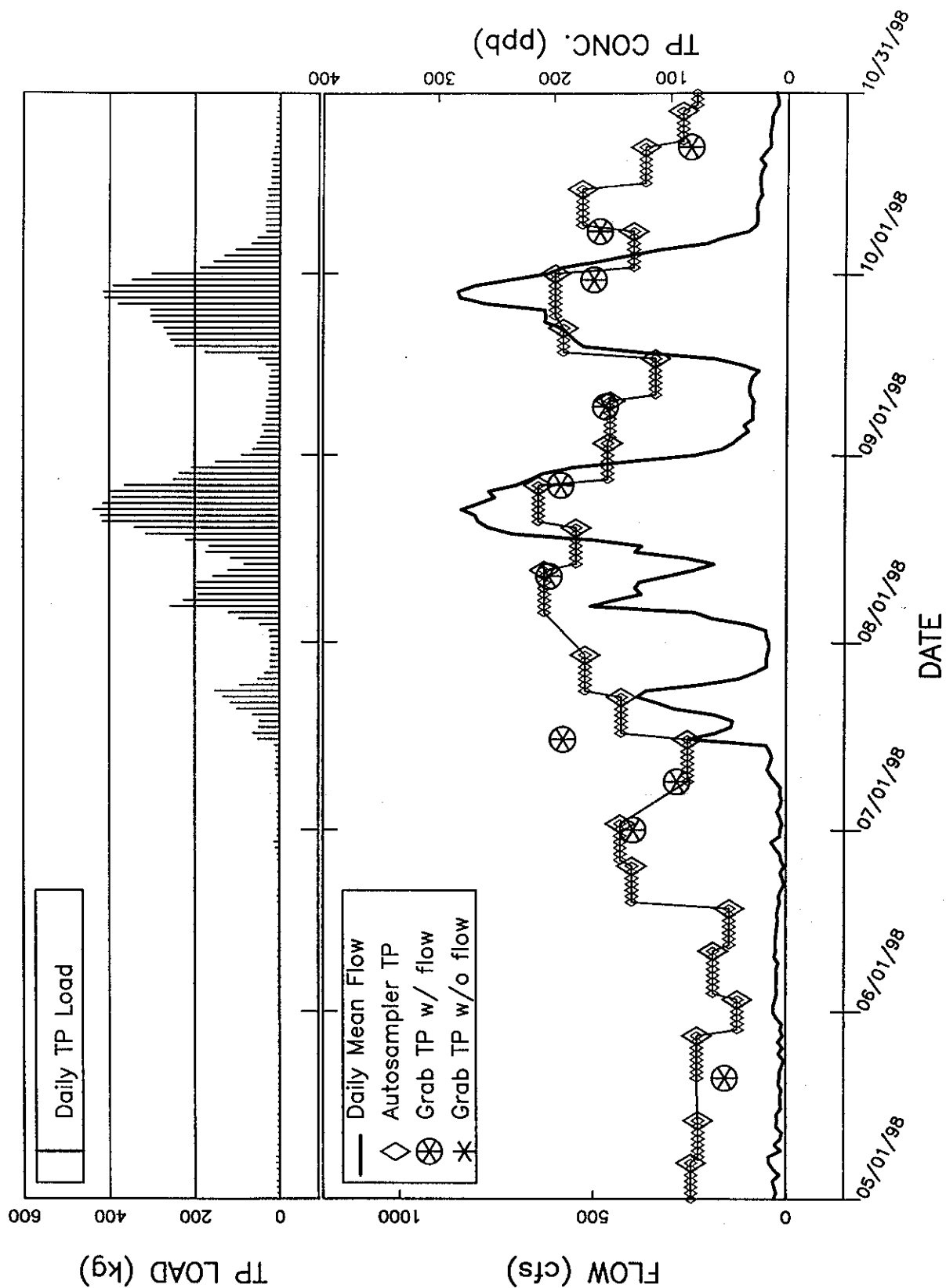




Figure 3. USSO TP Load, Flow and TP Concentration

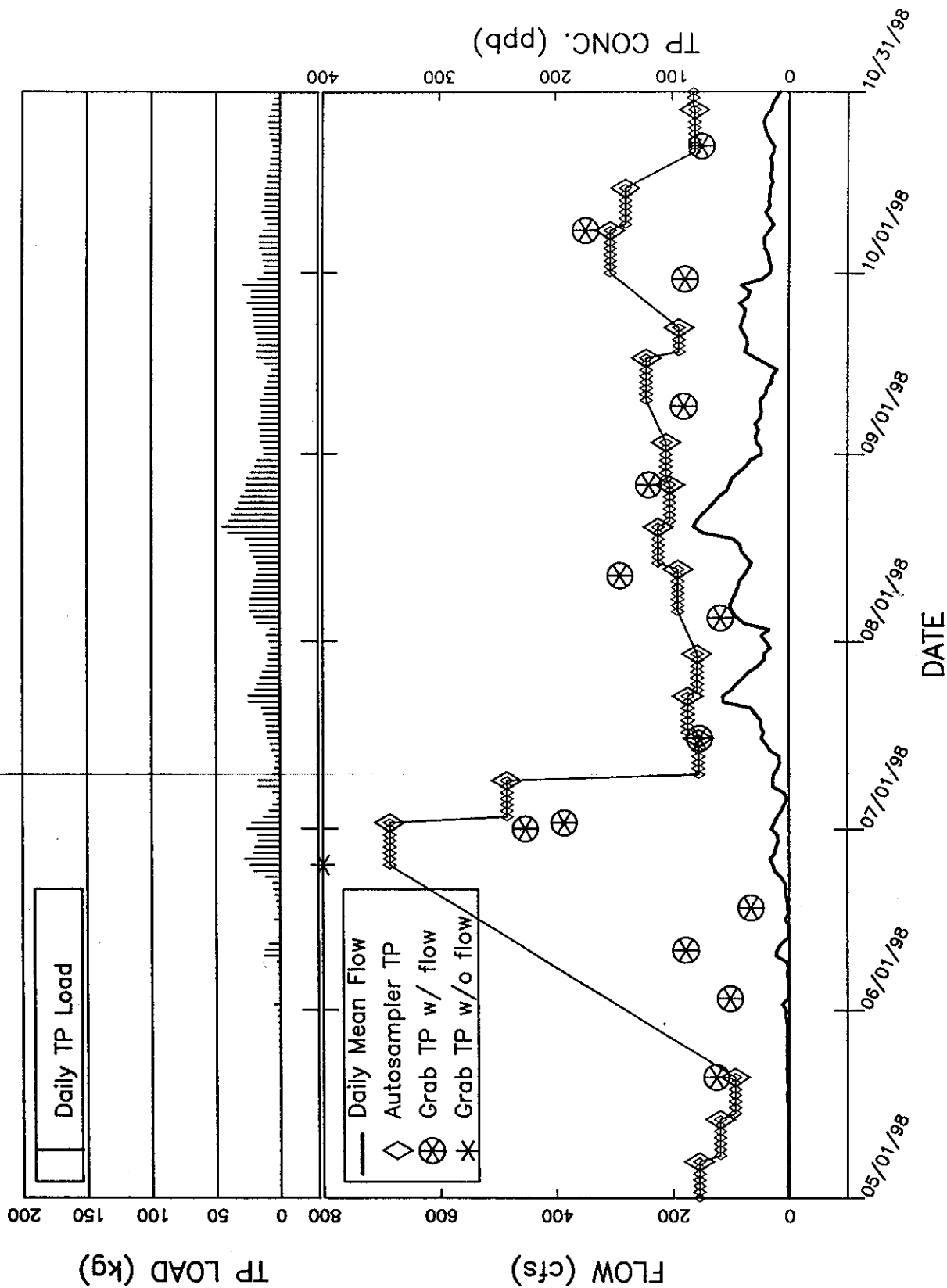


Figure 4. L28U FLOW

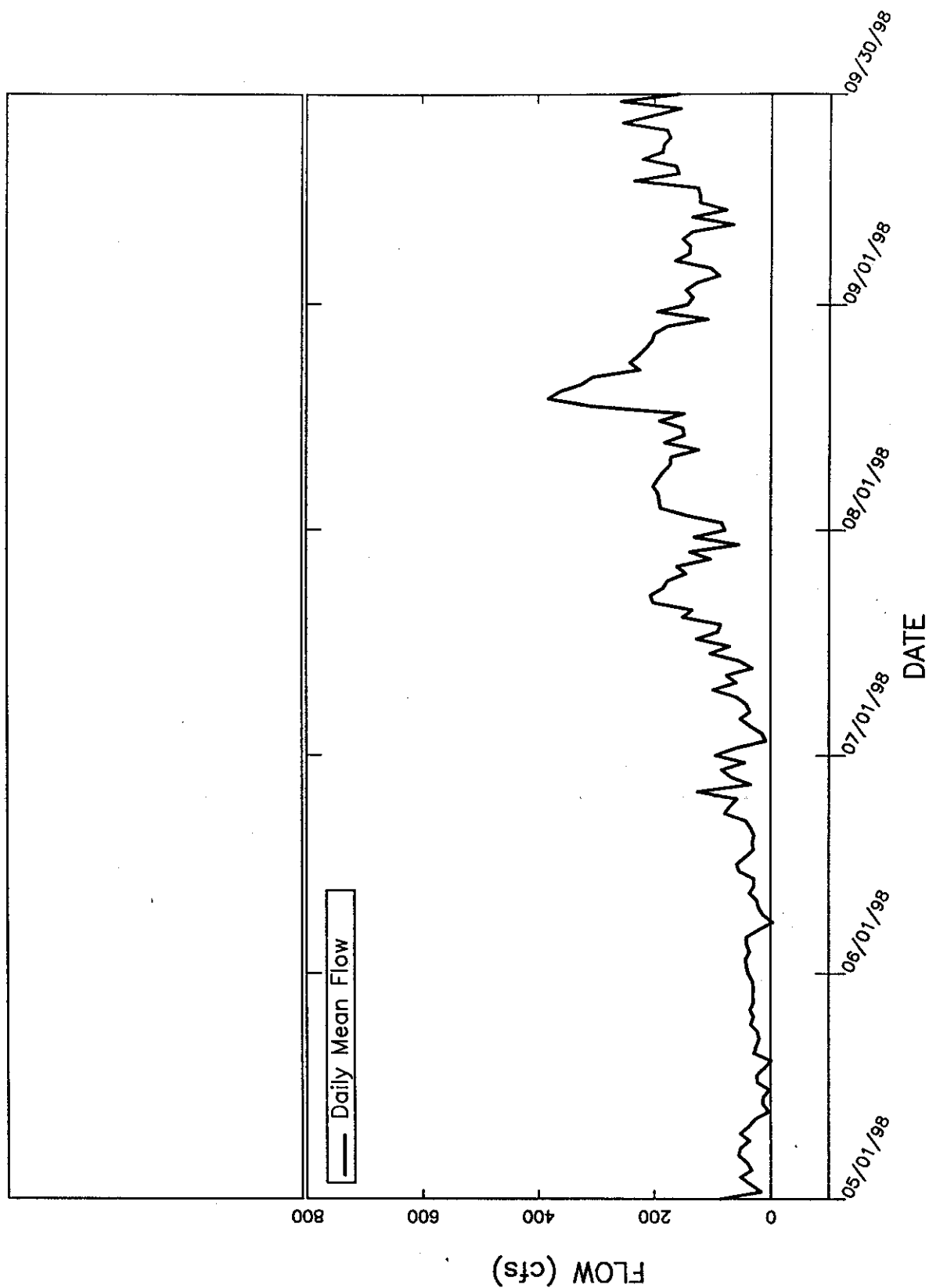


Figure 5. S140 TP Load, Flow and TP Concentration

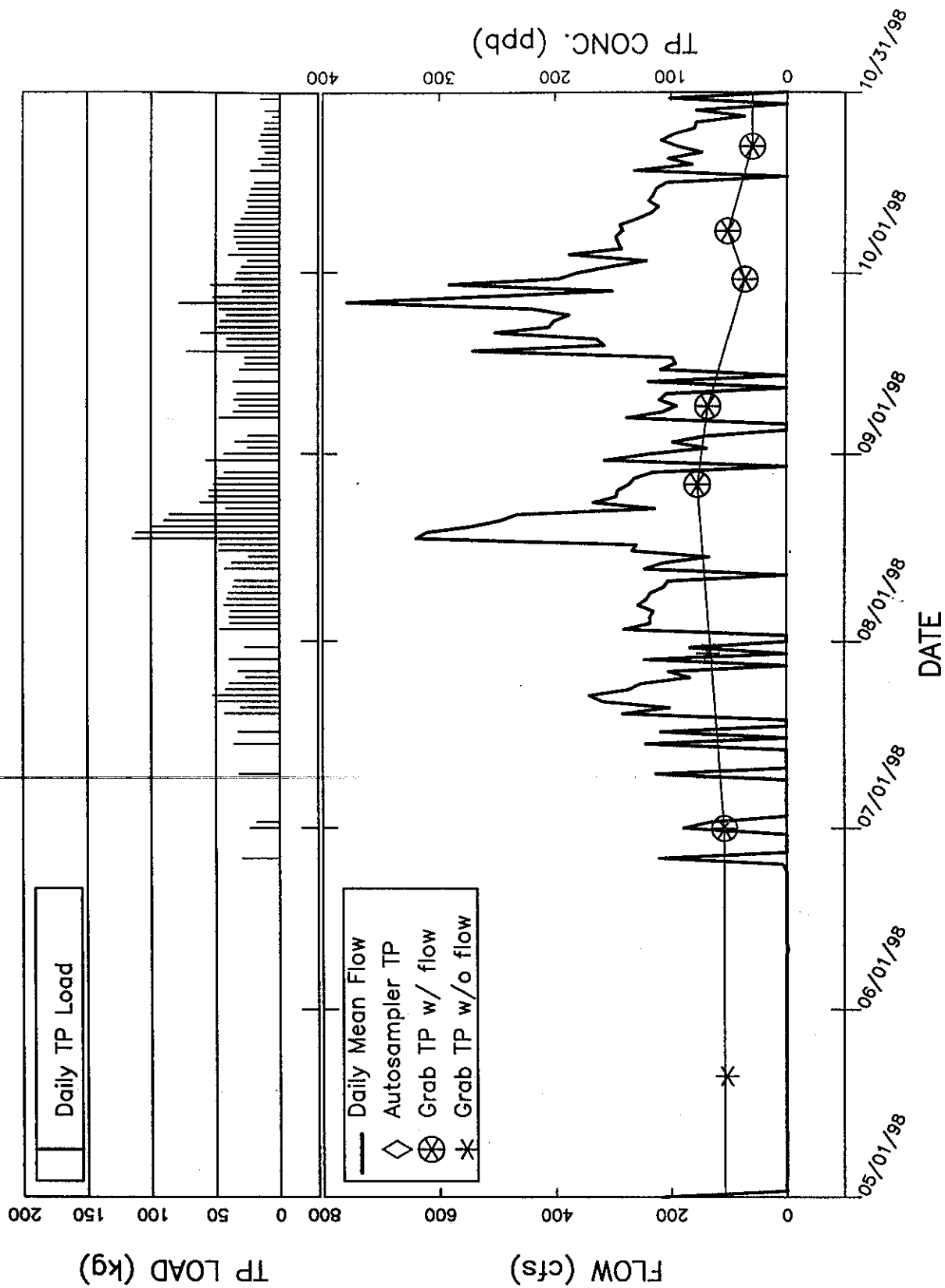


Figure 6. WWEIR TP Load, Flow and TP Concentration

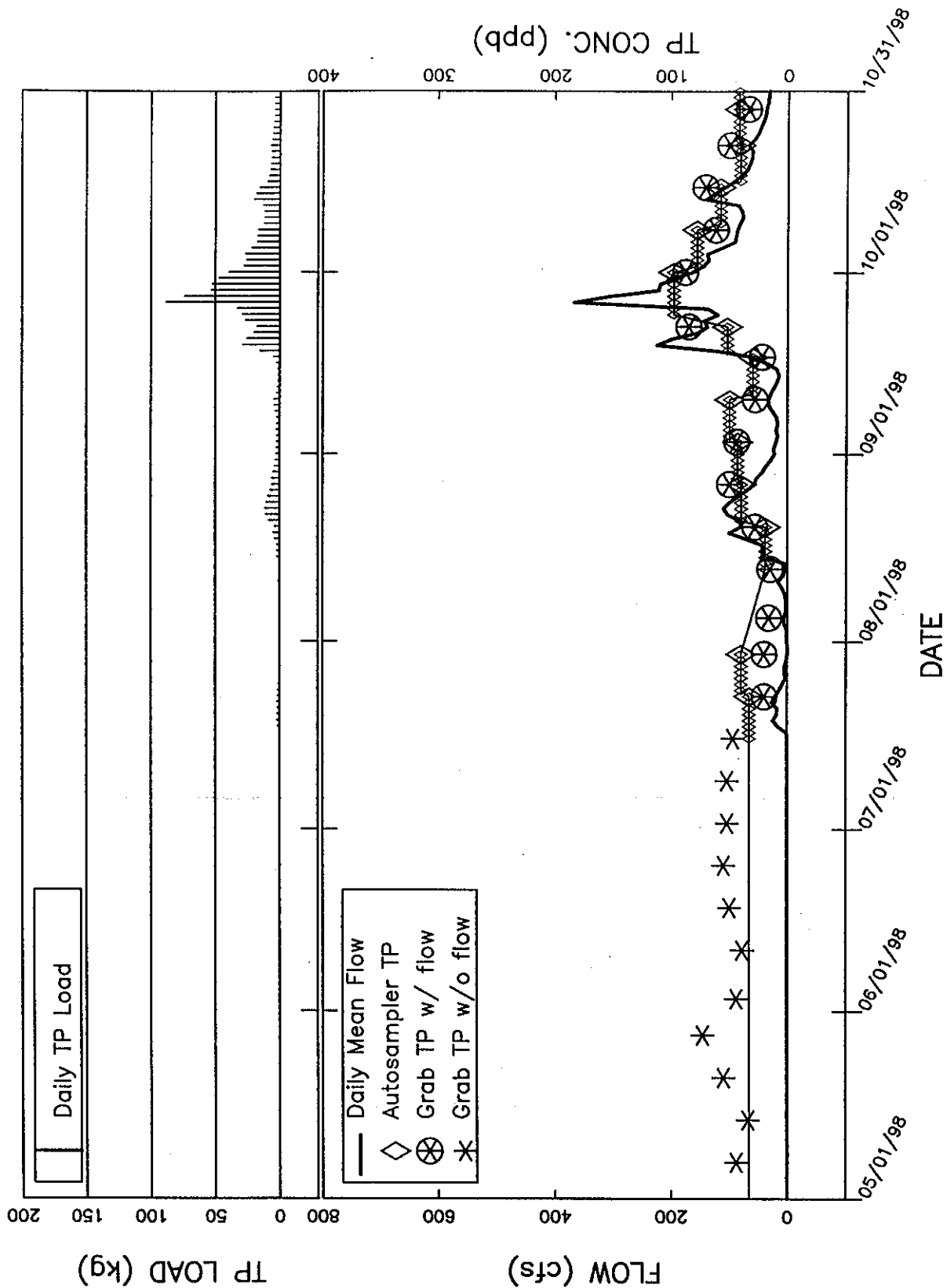


Figure 7. NFEED TP Load, Flow and TP Concentration

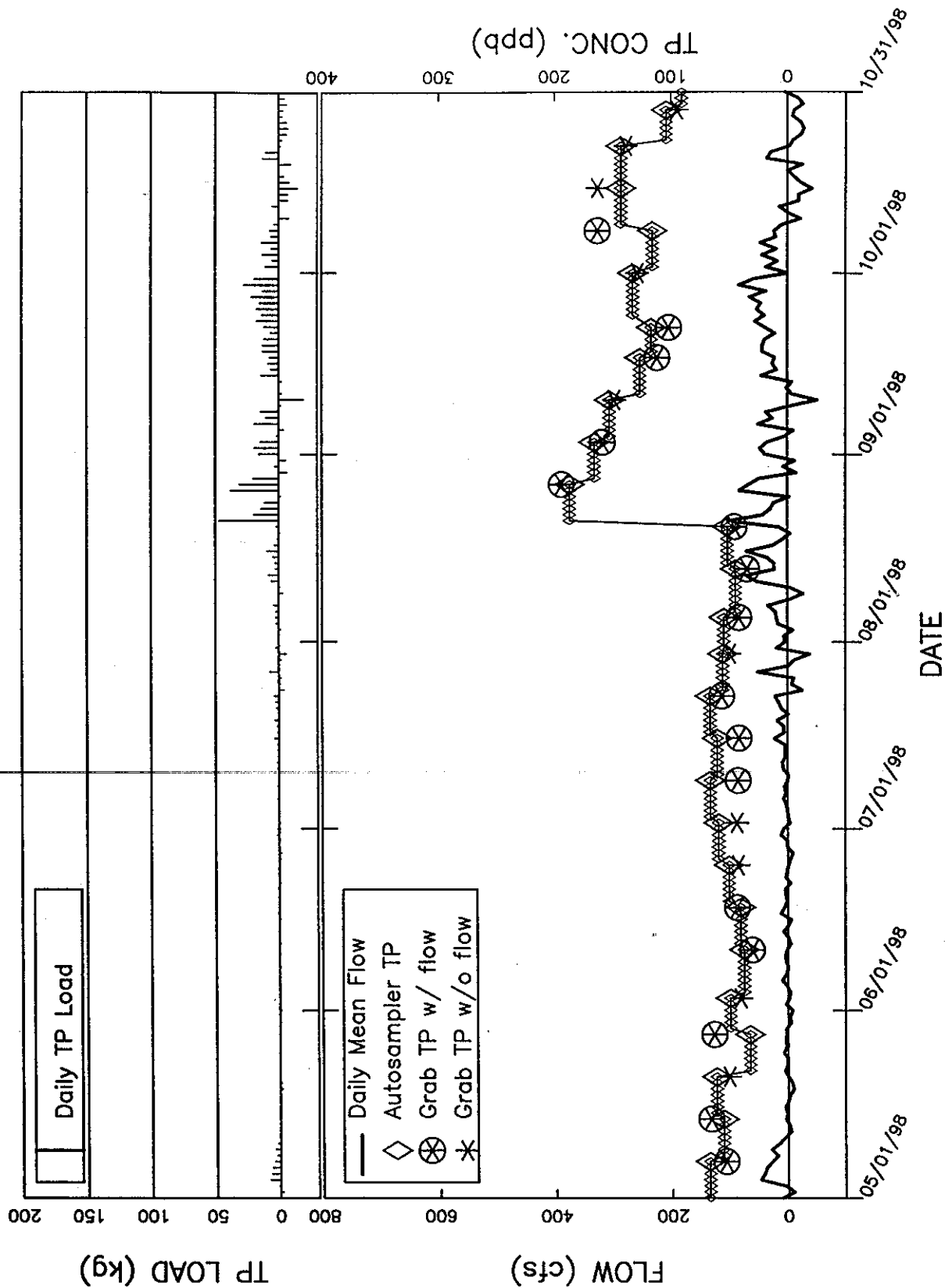


Figure 8. S190 TP Load, Flow and TP Concentration

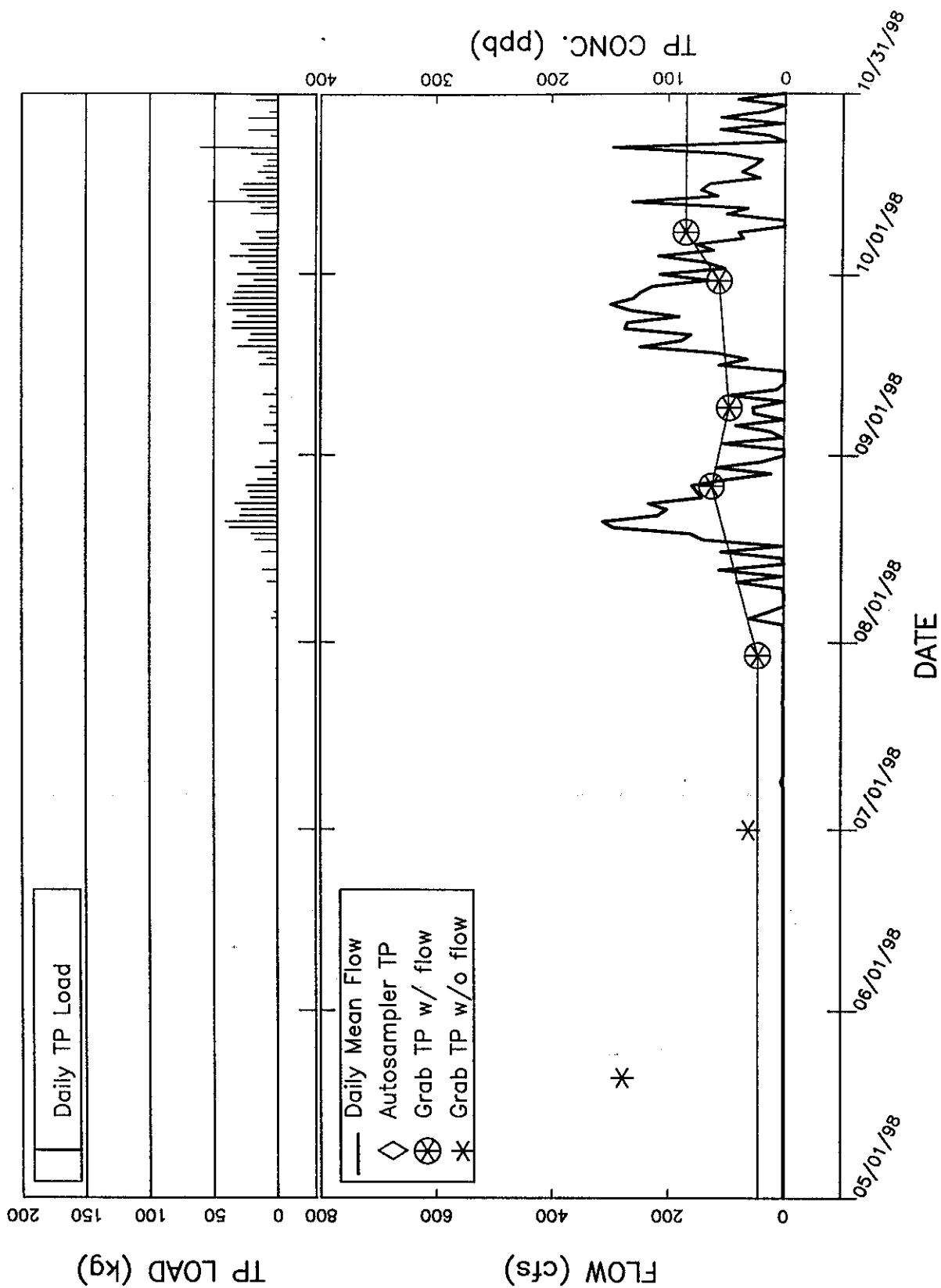


Figure 9. L28IN FLOW

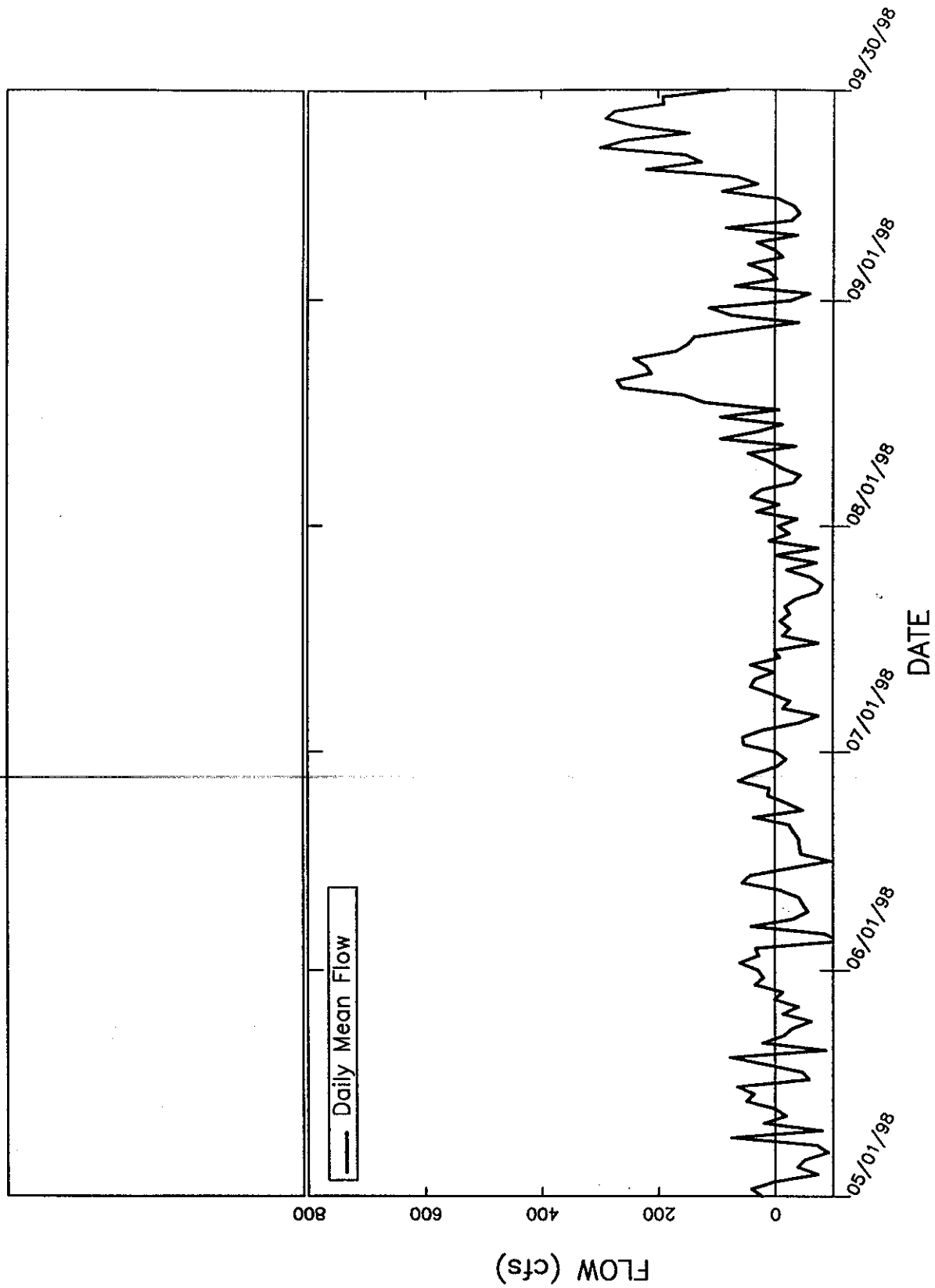
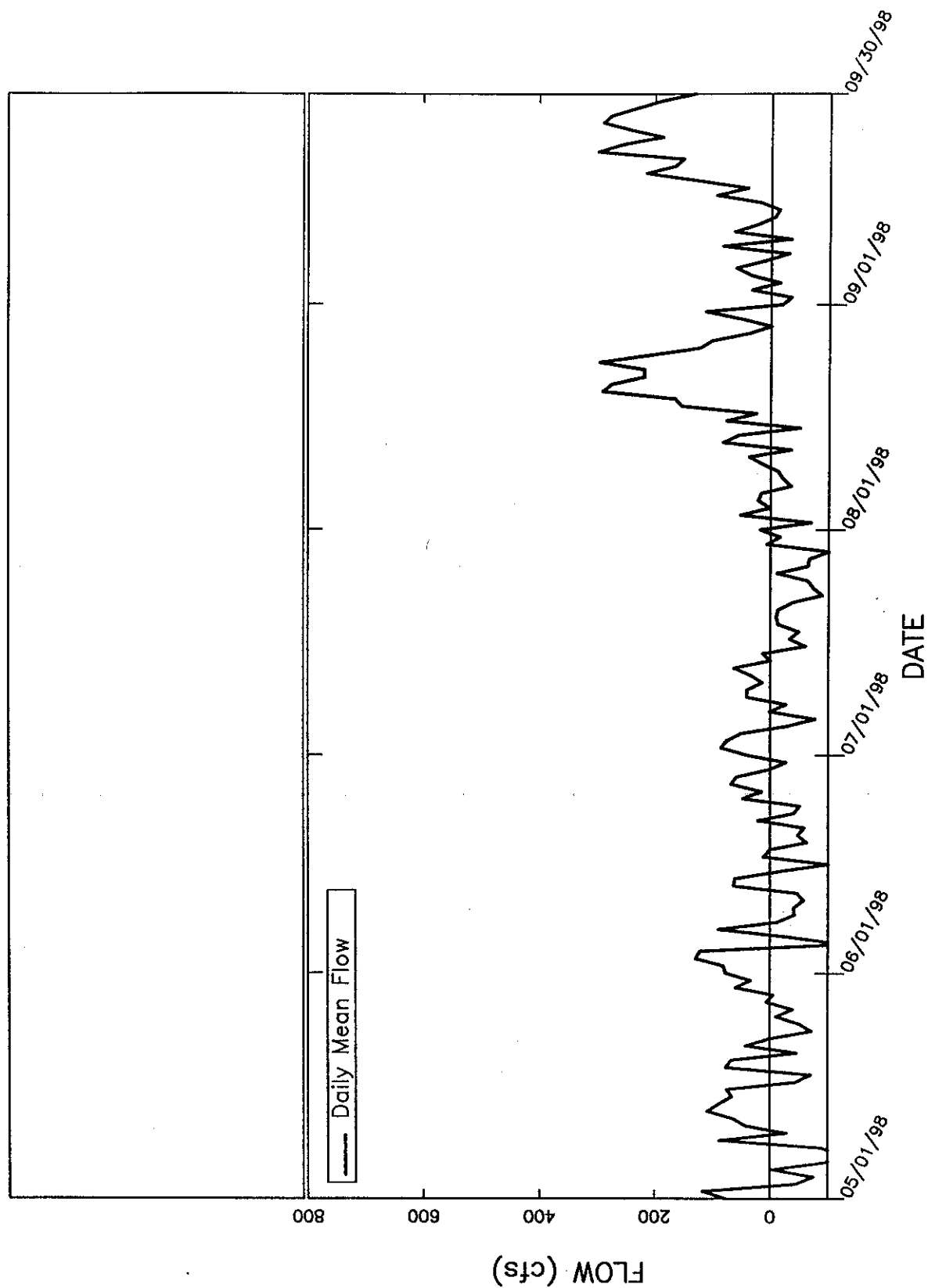


Figure 10. L28IS FLOW





**Table 1. Seminole/SFWMD Agreement total phosphorus (TP) data and water flow data summary for the period of May 1, 1998 through October 31, 1998.**

**For L3BRS:**

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iymdcomp
L3BRS	USL3BRS	L3BRS	L3BRS_O	16245	1	1	0	19841030

Grab sample n = 10

first datum : 1998/05/21

last datum : 1998/10/22

average value (arithmetic mean) = 143.5 ppb

range = 53 to 204 ppb

note: duplicate data in grab sample on 1998/05/21

Grab sample w/ +flow = 10

first datum : 1998/05/21

last datum : 1998/10/22

average value (arithmetic mean) = 143.5 ppb

range = 53 to 204 ppb

flow weighted mean for data w/ +flow = 178.5 ppb

regression: TP conc (ppb) =  $116.3994 + 0.1197 * \text{flow (cfs)}$

load ratio of comp:grab = 1.02438 (common days = 10)

Autosampler (flow proportional composite) n = 24

first datum : 1998/05/07

last datum : 1998/11/04

average value (arithmetic mean) = 128.1 ppb

range = 42 to 213 ppb

flow weighted mean for data = 175.4 ppb

regression: TP conc (ppb) =  $95.4672 + 0.1714 * \text{flow (cfs)}$

Flow data:

number of no flow days = 0

number of positive flow days = 184

total flow = 33395.961 cfs-d

number of negative flow days = 0

no missing flow data

Table 1. (continued)

For USSO :

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iyndcomp
USSO	USSO	USSO	USSO_O	16749	1	1	0	19961231

Grab sample n = 14

first datum : 1998/05/21

last datum : 1998/10/22

average value (arithmetic mean) = 106.1 ppb

range = 33 to 227 ppb

note: duplicate data in grab sample on 1998/06/03

note: a grab sample datum, 788 ppb on 1998/06/25 is considered to be an outlier and excluded in the calculations.

Grab sample w/ +flow = 14

first datum : 1998/05/21

last datum : 1998/10/22

average value (arithmetic mean) = 106.1 ppb

range = 33 to 788 ppb

flow weighted mean for data w/ +flow = 112.9 ppb

regression: TP conc (ppb) =  $94.3037 + 0.2956 * \text{flow (cfs)}$

load ratio of comp:grab = 01.02492 (common days = 8)

note: the outlier, 788 ppb on 1998/06/25 is excluded.

Autosampler (flow proportional composite) n = 18

first datum : 1998/05/07

last datum : 1998/11/04

average value (arithmetic mean) = 116.7 ppb

range = 47 to 343ppb

flow weighted mean for data = 112.7 ppb

regression: TP conc (ppb) =  $125.4830 - 0.1894 * \text{flow (cfs)}$

note: no composite sample after 1998/05/21 for 35 days

no composite sample after 1998/09/22 for 9 days

Flow data:

number of no flow days = 1

number of positive flow days = 182

total positive flow = 7474.681 cfs-d

number of negative flow days = 1

total negative flow = -0.080 cfs-d

no missing flow data

Table 1. (continued)

For S140:

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iymdcomp
S140	NONE	S140	S140_T	06754	1	0	0	

Grab sample n = 9

first datum : 1998/05/21

last datum : 1998/11/04

average value (arithmetic mean) = 53.7 ppb

range = 30 to 77 ppb

Grab sample w/ +flow = 6

first datum : 1998/07/01

last datum : 1998/10/22

average value (arithmetic mean) = 52.7 ppb

range = 30 to 77 ppb

flow weighted mean for data w/ +flow = 51.7 ppb

regression: TP conc (ppb) = 63.3170 - 0.0425 \* flow (cfs)

Flow data:

number of no flow days = 81

number of positive flow days = 100

total positive flow = 27132.102 cfs-d

number of negative flow days = 3

total negative flow = -4.220 cfs-d

no missing flow data

# Table 1. (continued)

## For WWEIR:

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iymdcomp
WWEIR	WWEIR	WWEIR	WFEED_O	16752	1	2	0	19971224

Grab sample n = 27

first datum : 1998/05/07  
last datum : 1998/11/04  
average value (arithmetic mean) = 45.5 ppb  
range = 15 to 88 ppb

Grab sample w/ +flow = 15

first datum : 1998/07/23  
last datum : 1998/10/28  
average value (arithmetic mean) = 42.2 ppb  
range = 15 to 88 ppb  
flow weighted mean for data w/ +flow = 59.6 ppb  
regression: TP conc (ppb) =  $15.7826 + 0.4478 * \text{flow (cfs)}$   
load ratio of comp:grab = 0.941257 (common days = 14)

Autosampler (flow proportional composite) n = 14

first datum : 1998/07/23  
last datum : 1998/11/04  
average value (arithmetic mean) = 47.6 ppb  
range = 19 to 98 ppb  
flow weighted mean for data = 61.8 ppb  
regression: TP conc (ppb) =  $30.5027 + 0.2464 * \text{flow (cfs)}$   
note: no composite sample after 1998/08/27 for 77 days  
no composite sample after 1998/07/30 for 14 days

## Flow data:

number of no flow days = 78  
number of positive flow days = 106  
total flow = 6895.669 cfs-d  
number of negative flow days = 0  
no missing flow data

**Table 1. (continued)**

**For NFEED:**

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iyndcomp
NFEED	NFEED	NONE	NFEED_O	16754	1	1	0	19960619

Grab sample n = 27

first datum : 1998/05/07

last datum : 1998/11/04

average value (arithmetic mean) = 83.4 ppb

range = 31 to 194 ppb

Grab sample w/ +flow = 16

first datum : 1998/05/07

last datum : 1998/10/08

average value (arithmetic mean) = 78.4 ppb

range = 31 to 194 ppb

flow weighted mean for data w/ +flow = 108.2 ppb

regression: TP conc (ppb) =  $33.7176 + 2.1841 * \text{flow (cfs)}$

load ratio of comp:grab = 1.03015 (common days = 16)

Autosampler (flow proportional composite) n = 27

first datum : 1998/05/07

last datum : 1998/11/04

average value (arithmetic mean) = 86.7 ppb

range = 33 to 187 ppb

flow weighted mean for data = 111.3 ppb

regression: TP conc (ppb) =  $59.7681 + 1.8208 * \text{flow (cfs)}$

Flow data:

number of no flow days = 0

number of positive flow days = 121

total positive flow = 2675.729 cfs-d

~~number of negative flow days = 62~~

total negative flow = -664.590 cfs-d

1 missing flow data on 1998/10/01

**Table 1. (continued)**

**For S190:**

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iymdcomp
S190	NONE	S190	S190_S	15987	1	0	0	

Grab sample n = 7

first datum : 1998/05/21

last datum : 1998/10/08

average value (arithmetic mean) = 63.0 ppb

range = 22 to 139 ppb

Grab sample w/ +flow = 5

first datum : 1998/07/30

last datum : 1998/10/08

average value (arithmetic mean) = 54.4 ppb

range = 22 to 85 ppb

flow weighted mean for data w/ +flow = 62.5 ppb

regression: TP conc (ppb) =  $36.1546 + 0.2167 * \text{flow (cfs)}$

**Flow data:**

number of no flow days = 102

number of positive flow days = 82

total flow = 9007.550 cfs-d

number of negative flow days = 0

no missing flow data

**Table 2. Seminole/SFWMD Agreement water flow data summary  
for the period of May 1, 1998 through September 30, 1998.**

**For L28IN:**

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iyndcomp
L28IN	L28IN	BSC5	L28IN_O	FF809	1	1	0	19970910

Flow data from 1998/05/01 to 1998/09/30:

number of no flow days = 0  
number of positive flow days = 79  
total flow = 6625.250 cfs-d  
number of negative flow days = 74  
total flow = -2814.700 cfs-d  
no missing flow data

**For L28IS :**

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iyndcomp
L28IS	L28IS	L28I@175	L28IS_O	FF812	1	1	0	

Flow data from 1998/05/01 to 1998/09/30:

number of no flow days = 0  
number of positive flow days = 90  
total flow = 8181.780 cfs-d  
number of negative flow days = 63  
total flow = -2770.900 cfs-d  
no missing flow data

**For L28U:**

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iyndcomp
L28U	L28U	BCS7	L28U_O	FF808	1	1	0	19970917

Flow data from 1998/05/01 to 1998/09/30:

number of no flow days = 0  
number of positive flow days = 151  
total flow = 16102.000 cfs-d  
number of negative flow days = 2  
total flow = -3.560 cfs-d  
no missing flow data

**Table 3. Seminole/SFWMD Agreement TP load calculation summary:  
Total TP Load and Total Flow.**

**For positive flow:**

<b>Term</b>	<b>Period</b>	<b>TP Data Used</b>	<b>Flow (kacft)</b>	<b>Load (kg)</b>
L3BRS	5/1/1998-10/31/1998	auto only (grab only)	81.706	14350 14292)
USSO	5/1/1998-10/31/1998	auto only (grab only)	18.287	2111 1914)
L28U	5/1/1998- 9/30/1998	Not Available	39.395	N/A
S140	5/1/1998-10/31/1998	grab only	66.381	3761
WWEIR	5/1/1998-10/31/1998	auto only (grab only)	16.871	1042 1034)
NFEED	5/1/1998-10/31/1998	auto only (grab only)	6.546	730 661)
S190	5/1/1997-10/31/1998	grab only	22.038	1355
L28IN	5/1/1998- 9/30/1998	Not Available	16.209	N/A
L28IS	5/1/1998- 9/30/1998	Not Available	20.017	N/A

**For negative (reverse) flow:**

<b>Term</b>	<b>Period</b>	<b>TP Data Used</b>	<b>Flow (kacft)</b>	<b>Load (kg)</b>
L3BRS	5/1/1998-10/31/1998	auto only	0.000	0
USSO	5/1/1998-10/31/1998	auto only (grab only)	<0.001	0.1 0.0)
L28U	5/1/1998- 9/30/1998	Not Available	0.009	N/A
S140	5/1/1998-10/31/1998	grab only	0.010	0.6
WWEIR	5/1/1998-10/31/1998	auto only	0.000	0
NFEED	5/1/1998-10/31/1998	auto only (grab only)	1.626	168 196)
S190	5/1/1997-10/31/1998	grab only	0.000	0
L28IN	5/1/1998- 9/30/1998	Not Available	6.886	N/A
L28IS	5/1/1998- 9/30/1998	Not Available	6.779	N/A



**Table 4. Seminole/SFWMD Agreement total phosphorus (TP) load calculation  
monthly summary by station  
for the period of May 1, 1998 through October 31, 1998.**

Note 1: Flow is in million cubic meters and in (thousand acre-feet).

Note 2: Flow-weighted mean concentration for each month is calculated by dividing monthly load with monthly total flow.

**For L3BRS :**

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L3BRS	1998/05	31	1.546 ( 1.254)	116.930	75.619	0.000 ( 0.000)	0.000
L3BRS	1998/06	30	1.589 ( 1.289)	125.265	78.812	0.000 ( 0.000)	0.000
L3BRS	1998/07	31	8.102 ( 6.568)	1144.204	141.232	0.000 ( 0.000)	0.000
L3BRS	1998/08	31	34.757 (28.178)	6777.766	195.005	0.000 ( 0.000)	0.000
L3BRS	1998/09	30	25.478 (20.655)	4724.777	185.447	0.000 ( 0.000)	0.000
L3BRS	1998/10	31	10.234 ( 8.297)	1461.259	142.788	0.000 ( 0.000)	0.000

**For USSO :**

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
USSO	1998/05	31	0.223 ( 0.181)	17.099	76.556	0.000 ( 0.000)	0.000
USSO	1998/06	30	0.770 ( 0.624)	227.676	295.829	0.000 ( 0.000)	-0.051
USSO	1998/07	31	3.362 ( 2.725)	356.935	106.183	0.000 ( 0.000)	0.000
USSO	1998/08	31	7.194 ( 5.832)	732.406	101.810	0.000 ( 0.000)	0.000
USSO	1998/09	30	4.243 ( 3.439)	478.633	112.818	0.000 ( 0.000)	0.000
USSO	1998/10	31	2.497 ( 2.024)	297.969	119.353	0.000 ( 0.000)	0.000

**For L28U :**

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg
L28U	1998/05	31	2.291 ( 1.857)			-0.001 (-0.001)	
L28U	1998/06	30	3.198 ( 2.592)			-0.008 (-0.006)	
L28U	1998/07	31	7.319 ( 5.934)			0.000 ( 0.000)	
L28U	1998/08	31	15.213 (12.333)			0.000 ( 0.000)	
L28U	1998/09	30	11.374 ( 9.221)			0.000 ( 0.000)	

**For S140 :**

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg
S140	1998/05	31	0.532 ( 0.431)	28.728	54.000	-0.002 (-0.002)	-0.127
S140	1998/06	30	0.555 ( 0.450)	29.985	54.000	-0.008 (-0.006)	-0.431
S140	1998/07	31	8.448 ( 6.849)	521.759	61.759	0.000 ( 0.000)	0.000
S140	1998/08	31	20.167 (16.349)	1471.492	72.967	0.000 ( 0.000)	0.000
S140	1998/09	30	20.883 (16.930)	1075.160	51.485	0.000 ( 0.000)	0.000
S140	1998/10	31	15.796 (12.806)	633.858	40.128	0.000 ( 0.000)	0.000

Table 4. (continued)

For WWEIR :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg
WWEIR	1998/05	31	0.000 ( 0.000)	0.000		0.000 ( 0.000)	0.000
WWEIR	1998/06	30	0.000 ( 0.000)	0.000		0.000 ( 0.000)	0.000
WWEIR	1998/07	31	0.400 ( 0.325)	13.851	34.597	0.000 ( 0.000)	0.000
WWEIR	1998/08	31	2.988 ( 2.423)	98.643	33.011	0.000 ( 0.000)	0.000
WWEIR	1998/09	30	7.287 ( 5.908)	550.714	75.571	0.000 ( 0.000)	0.000
WWEIR	1998/10	31	6.195 ( 5.022)	379.183	61.210	0.000 ( 0.000)	0.000

For NFEED :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
NFEED	1998/05	31	0.662 ( 0.537)	40.800	61.623	-0.112 (-0.091)	-6.782
NFEED	1998/06	30	0.180 ( 0.146)	8.182	45.465	-0.111 (-0.090)	-5.474
NFEED	1998/07	31	0.552 ( 0.448)	34.183	61.872	-0.242 (-0.197)	-13.669
NFEED	1998/08	31	2.031 ( 1.647)	233.646	115.033	-0.186 (-0.151)	-17.611
NFEED	1998/09	30	2.390 ( 1.938)	323.354	135.292	-0.192 (-0.156)	-28.504
NFEED	1998/10	31	0.731 ( 0.592)	90.265	123.537	-0.782 (-0.634)	-95.883

For S190 :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
S190	1998/05	31	0.000 ( 0.000)	0.000		0.000 ( 0.000)	0.000
S190	1998/06	30	0.001 ( 0.000)	0.011	22.000	0.000 ( 0.000)	0.000
S190	1998/07	31	0.015 ( 0.012)	0.329	22.000	0.000 ( 0.000)	0.000
S190	1998/08	31	6.575 ( 5.330)	351.094	53.399	0.000 ( 0.000)	0.000
S190	1998/09	30	8.435 ( 6.838)	446.405	52.923	0.000 ( 0.000)	0.000
S190	1998/10	31	7.012 ( 5.685)	557.008	79.434	0.000 ( 0.000)	0.000

For L28IN :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28IN	1998/05	31	1.164 ( 0.943)			-1.938 (-1.571)	
L28IN	1998/06	30	1.089 ( 0.883)			-1.884 (-1.528)	
L28IN	1998/07	31	0.643 ( 0.521)			-1.896 (-1.537)	
L28IN	1998/08	31	6.217 ( 5.040)			-0.568 (-0.460)	
L28IN	1998/09	30	7.097 ( 5.753)			-0.600 (-0.487)	

For L28IS :

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28IS	1998/05	31	2.486 ( 2.016)			-1.957 (-1.586)	
L28IS	1998/06	30	2.068 ( 1.677)			-1.862 (-1.509)	
L28IS	1998/07	31	1.127 ( 0.914)			-2.040 (-1.654)	
L28IS	1998/08	31	6.460 ( 5.238)			-0.548 (-0.444)	
L28IS	1998/09	30	7.876 ( 6.385)			-0.373 (-0.302)	

## Results of Flow Comparisons

Similarity of flow data at different sampling locations within a canal is one indication as to whether different measuring methods are providing essentially the same data.

### West Feeder Canal, North Feeder Canal and S190

Because S190 is fed by the West and North Feeder Canals, the flow at S190 should be close to the sum of these two flows. The total flows matched closely and the graphs for the daily flows of the three sites and the sum of the West and North Feeder Canals show that the daily peaks also match well (Figure 11).

The magnitude of high peaks of the sum and the peaks of S190 flow matched well except for 4 occasions, showing that the calibration for NFEED flow calculations has been significantly improved. However, the problem with oscillation between positive and negative signals at NFEED during no net flow conditions when S190 was closed has not been completely resolved.

### S190, L28IN and L28IS

Flow in the L28 Interceptor Canal is measured by the USGS at the southern boundary of the Big Cypress Seminole Indian Reservation (site L28IN) and at the western boundary of the Miccosukee Reservation (site L28IS). The S-190 spillway located within the Seminole Reservation is controlled by the District and determines the flow in the L28I Canal. Figure 12 shows that flow calibration at L28IN has been improved and the L28IN flow data is correlating well with the L28IS flow data for the present reporting period.

Figure 13 presents the flow data at these three sites from May 1, 1998 through September 30, 1998. It can be observed that the flows at L28IN and L28IS correlate very well with the flow from S-190 during the high flow period. However, both L28IN and L28IS flows show that the two fluctuated from about positive 100 cfs-day to about negative 100 cfs-day when S190 was closed. The daily records for L28IN and L28IS were so much in synchronization that it is hard to dismiss these signals simply as background noise. This phenomenon calls for further investigation.

### L28U and USSO

In Figure 14 the L-28 Canal flow measured at the USSO site is compared with the flow measured at L28U. The highs and lows in the flow pattern correlate fairly well, but flow at L28U is more variable than the flow at USSO. Generally, the flow at L28U is higher than the flow at USSO with the difference becoming more prominent during high flow events. Sometimes L28U flow being more than two times higher than USSO flow on peak flow days. This observation suggests that there are inflows to the L28 Canal either from ground water seepage or surface inflow. It was not possible to compare the TP loads at the sites because the TP concentration data at L28U were not available for the reporting period. The flow data recorded at a UVM site, G89, which is located downstream from USSO and the G89 structure, were consistently between the USSO flow and L28IN flow. The G89 structure had been closed and, thus, there was no flow through the structure during the reporting period. A drainage channel had been identified between USSO and G89 UVM site, but the quantity and the nature of the flow at the channel has not measured yet.

These flow data may indicate that there is some additional water input to the system. There are eight identified inflows to the L-28 Canal between USSO and L28U. However, it should be emphasized that the differences among the daily flow data could merely reflect the inaccuracy of some data for one or more of the sites caused by bias or lack of calibration. It will be necessary to either calibrate the flow data or define the flow more accurately before a reliable total phosphorus load calculation can be made.

**Figure 11. Comparison of WWEIR, NFEED, and S190 Flows**

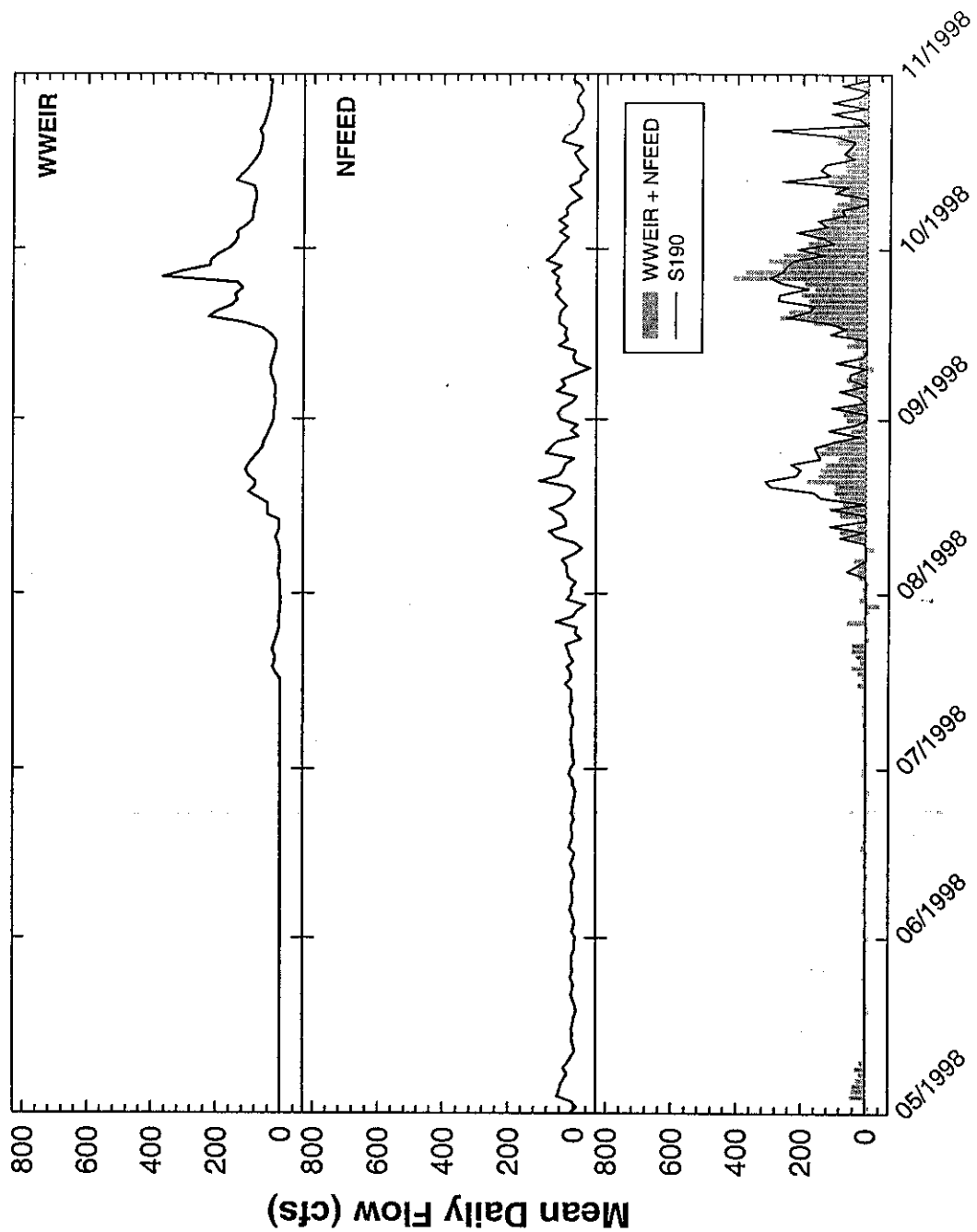


Figure 12. Relationship between L28IN Flow and L28IS Flow.

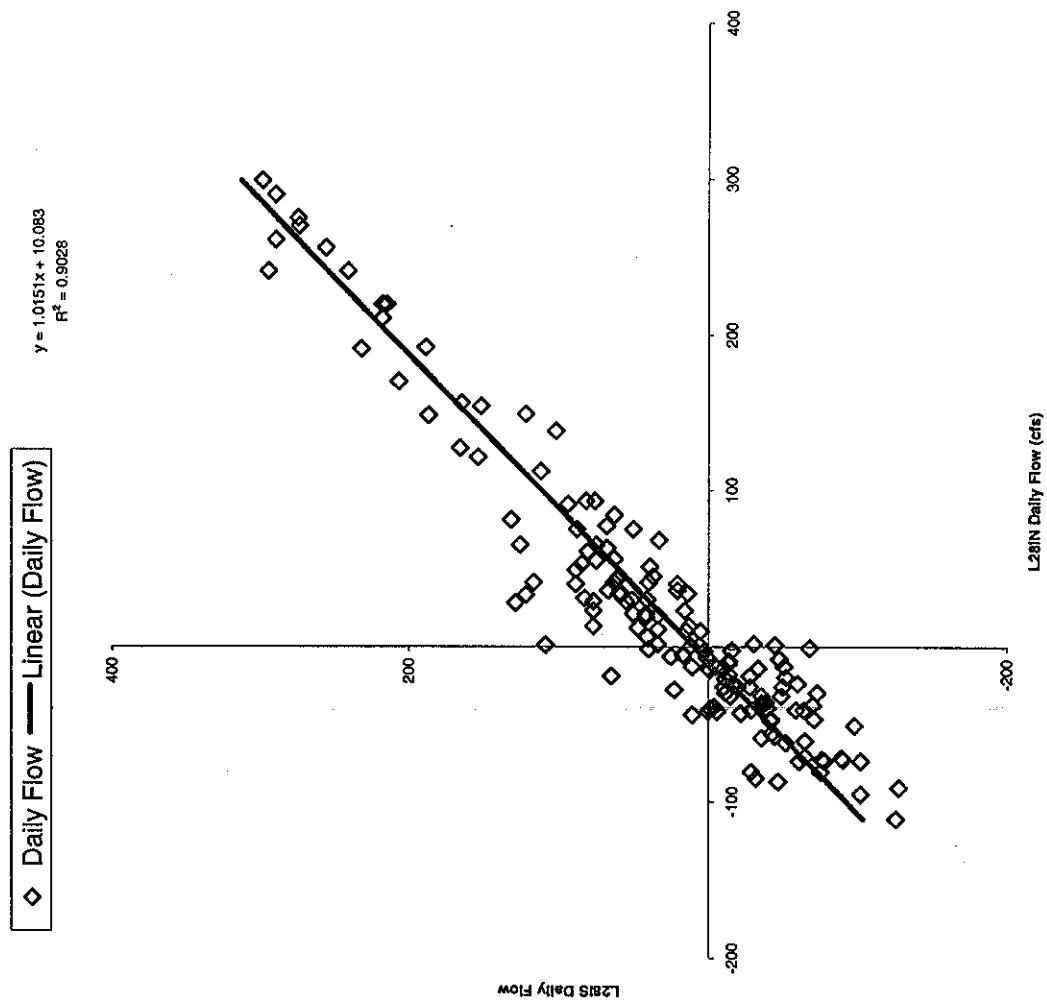


Figure 13. Comparison of L28IN and L28IS Flows with S190 Flow.

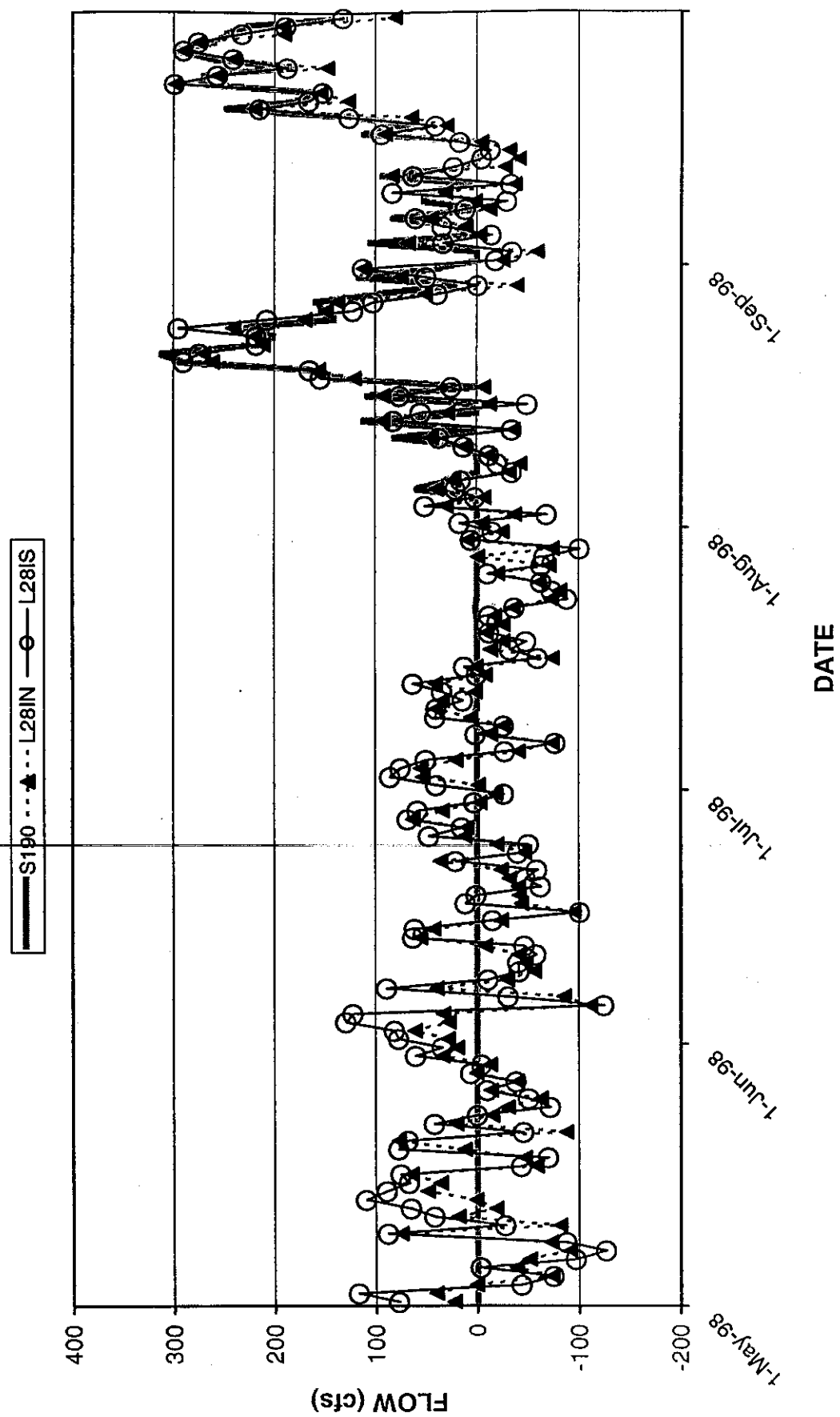
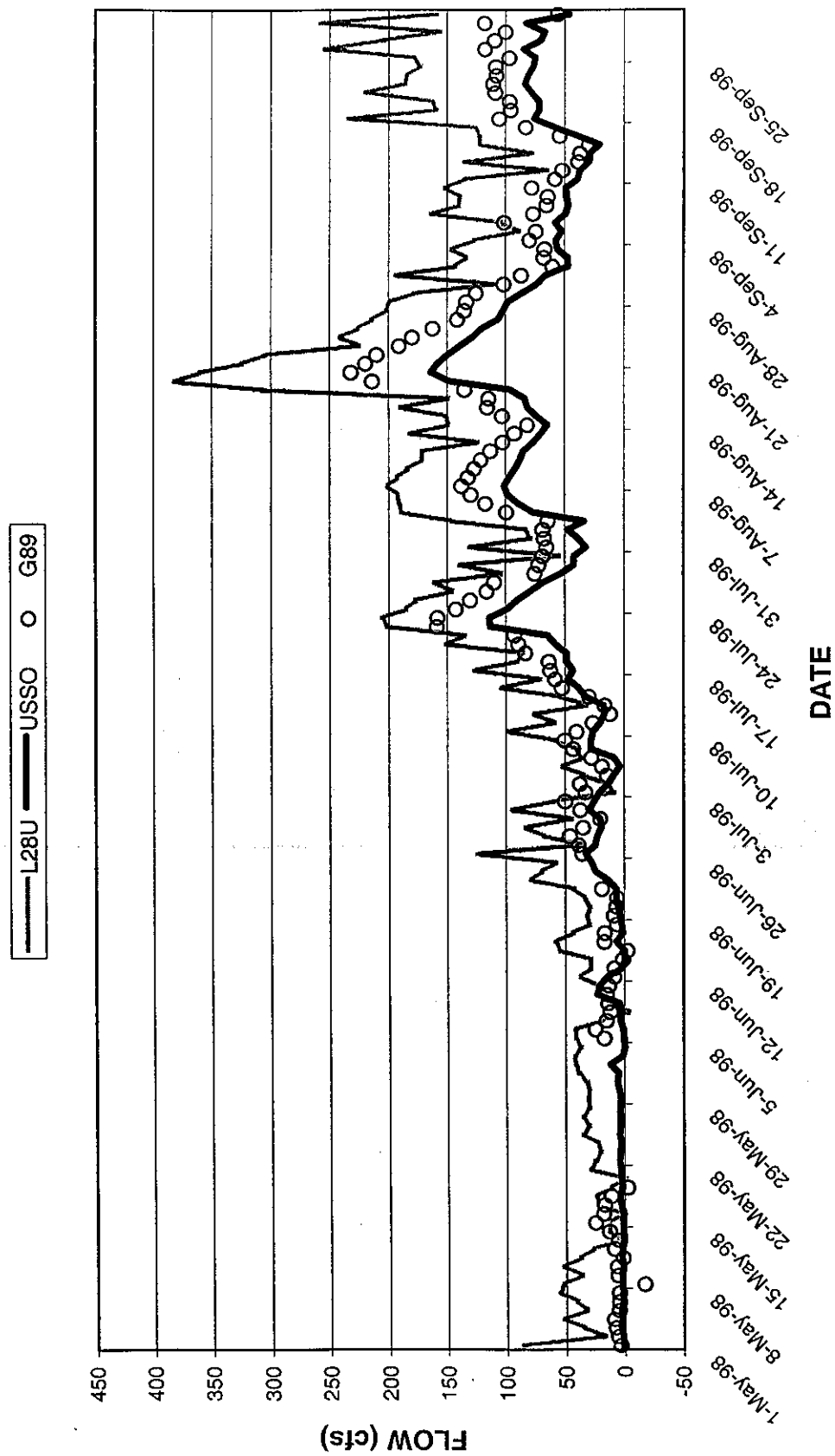


Figure 14. Comparison of L28U Flow with USSO Flow



Note: G89 denotes the G89 UVM monitoring site, which is located downstream of USSO and the G89 Structure. The G89 Structure was closed and there was no flow through the structure for the reporting period.



## Water Quality Data

Total phosphorus (TP) concentration data collected by both grab samples and auto-samplers (Figure 15) and total nitrogen (TN) data calculated by the sum of total Kjeldahl nitrogen (TKN) and total nitrite and nitrate (NOX) (Figure 16) at the six sites, WVEIR, NFEED, S190, L3BRS, USSO, and S140 are presented as classic notched box plots. The narrowest part of the notch represents the median value for each site. The complete notch represents the lower and upper 95% confidence interval values. If the notches of two sites do not overlap, the respective site medians are significantly different at the 95% confidence level. The top and bottom sides of boxes represent the 75<sup>th</sup> and 25<sup>th</sup> percentiles, respectively. The whiskers show the range of values that fall within 1.5 times the absolute value of the difference between 75<sup>th</sup> and 25<sup>th</sup> percentiles. Values outside of the whiskers are plotted with asterisks if they do not exceed 3 times the absolute value of the difference between the 75<sup>th</sup> and 25<sup>th</sup> percentiles. Values beyond 3 times the absolute value are plotted with empty circles.

Figure 15 presents notched box plots for TP concentrations at the six District sampling sites. The TP concentration data from grab samples and auto-samplers were combined at sites where both sampling methods were used. The WVEIR site has the lowest TP concentrations of all sites. The median TP concentration at NFEED site was highest among the western sites but much lower than last reporting period. The differences in the median values among the three western sites are not significant for this reporting period. L3BRS has the highest TP concentrations among six sites, followed by USSO.

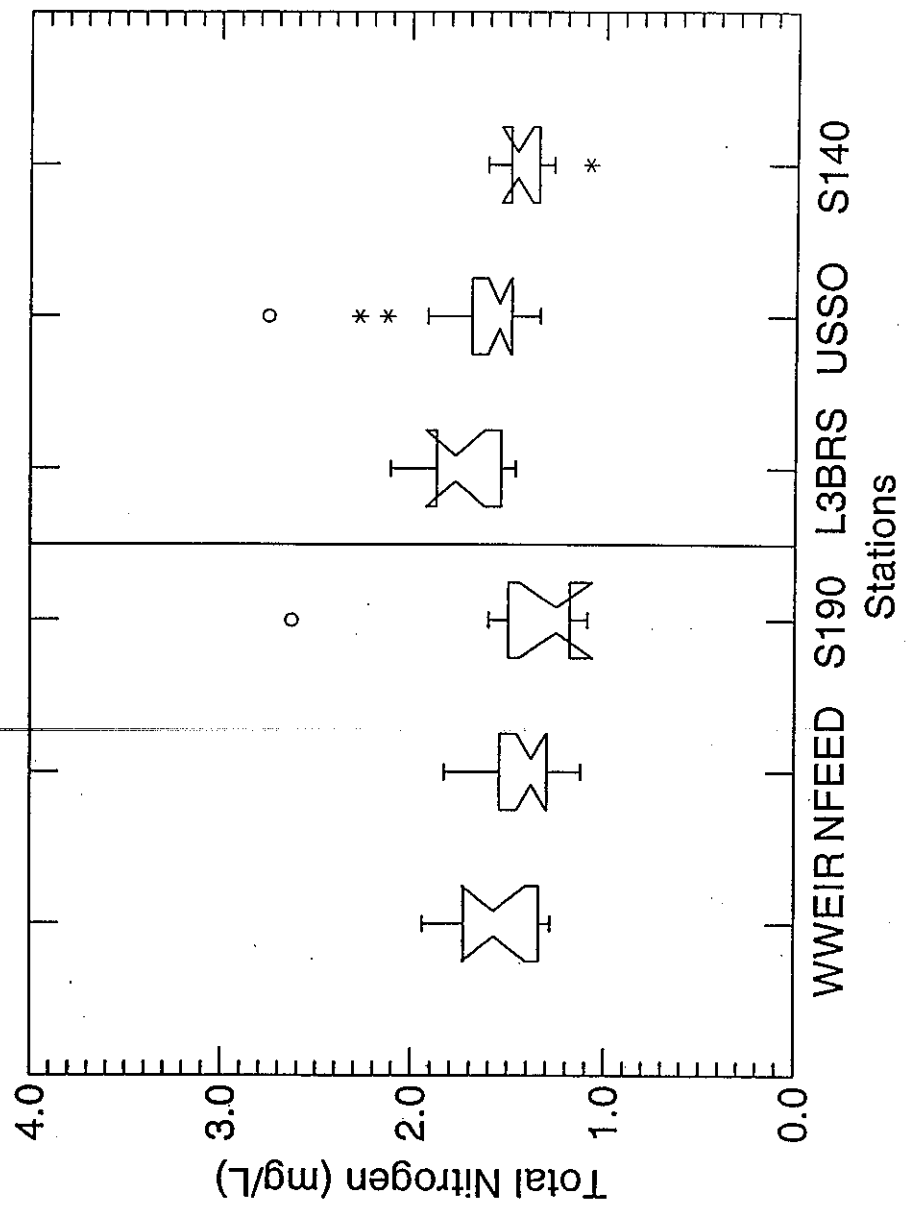
The notched box plots for total nitrogen concentrations are much more uniform among sites than TP concentrations (Figure 16). This may imply that TN has more natural sources and TP has more anthropologic sources but the results can not be interpreted until the variability of the nitrogen species comprising total nitrogen are evaluated for each site and compared.

The water quality data collected by grab sampling are summarized for each site in Tables 5 through 10. The tables are organized to present basic statistics for each parameter collected in accordance with Table 1.2 in the Standard Operating Procedures for Water Quality Collection in Support of the Big Cypress Seminole Indian Reservation Water Quality Agreement, Water Quality Monitoring Division, SFWMD, May 22, 1996, as well as the associated water quality criterion for those parameters listed in the table of Surface Water Quality Criteria, Chapter 62-302.530, F.A.C. and Table 12 of the Seminole Tribe's Water Quality Standards.

Comparison of the data with the criteria indicated that dissolved oxygen (D.O.) and total iron were the only parameters that exceeded their criteria. The dissolved oxygen exceedences occurred at all sites. D.O. is measured once per week when the auto-samplers are serviced or grab samples collected during daylight hours. D.O. values, however, change throughout the day usually exhibiting highs in mid- to late afternoon and lows in early morning before sunrise. A variety of factors affect the D.O. concentration and the magnitude of the daily range. The values reported here are typical of Everglades Protection Area data from canals and marsh stations.

Most of the trace metal measurements for all sites, for cadmium, copper, lead, and zinc, were below the method detection limits (MDL). The three values measured above the detection limit during this reporting period are compared with the calculated criteria in Table 11. All measurements were below the criteria values, which are derived from the water hardness. The total iron concentration measured at L3BRS on October 8, 1998, exceeded 1 mg/L, the Class III Standard criterion for the metal. The high iron concentration, one of the major ions in the natural waters of South Florida, probably reflects the high clay mineral content in the sample.

**Figure 15. Comparison of TN Concentrations and Median Values.**



**Figure 16. Comparison of TP Concentrations and Median Values**

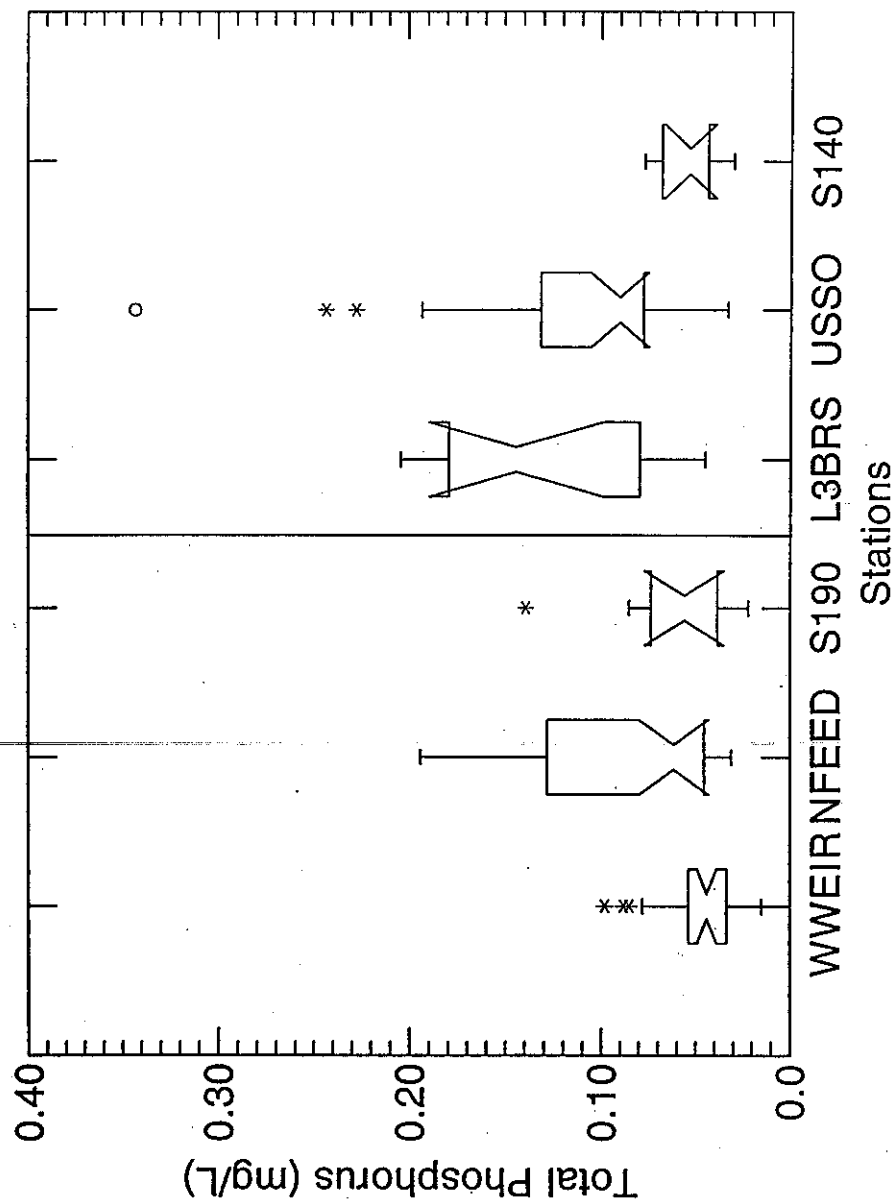


Table 5. Summary of Water Quality Parameters Collected by Grab Sampling at Station L3BRS for the Period from May 1998 through October 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
<b>Physical</b>					
Water Temperature (°C)	29.5	27.0 - 31.9	1.6	9	Not Applicable
Specific Conductance (µmhos/cm)	469	331 - 566	83	9	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	13.0	3.0 - 23.0	14.1	2	Not Applicable
Turbidity (NTU)	3.3	0.8 - 13.0	3.7	9	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	1.8	0.2 - 3.8	1.1	9	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	22.7	2.9 - 48.1	14.0	9	Not Applicable
Water pH	7.2	6.7 - 7.5	0.3	9	Not less than 8.0 or greater than 8.5 units
Apparent Color (PCU)	151	62 - 223	63	9	Not Applicable
Total Hardness (mg/L)	159	155 - 163	6	2	Not Applicable
<b>Major Ions</b>					
Calcium (mg/L)	54.7	53.6 - 55.7	1.5	2	Not Applicable
Sodium (mg/L)	31.6	27.0 - 36.2	6.5	2	Not Applicable
Potassium (mg/L)	2.7	2.7 - 2.8	0.0	2	Not Applicable
Magnesium (mg/L)	5.5	5.2 - 5.9	0.5	2	Not Applicable
Total Alkalinity (mg/L)	160.2	114.5 - 190.6	28.0	9	Not less than 20 mg/L
Sulfate (mg/L)	8.0	7.3 - 8.6	0.9	2	Not Applicable
Chloride (mg/L)	41.9	22.7 - 54.7	11.5	9	Not greater than 10% of background
<b>Nutrients</b>					
Ammonium (mg/L)	0.107	<0.009 - 0.320	0.109	9	Not Applicable
Nitrate+nitrite (mg/L)	0.089	0.008 - 0.255	0.086	9	Not Applicable
Total Nitrogen (mg/L)	1.76	1.46 - 2.11	0.23	9	Not Applicable
Orthophosphate (mg/L)	0.099	0.028 - 0.166	0.045	9	Not Applicable
Total Phosphorus (mg/L)	0.148	0.045 - 0.204	0.053	9	Not Applicable
Silica (mg/L)	9.6	7.2 - 12.0	3.4	2	Not Applicable
<b>Trace Elements</b>					
Arsenic (µg/L)	<1.5	<1.5 - <1.5		1	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.3	<0.3 - <0.3		1	Less than or equal to calculated value using: $e^{(0.7852(\ln+3.49))}$
Copper (µg/L)	3.9	3.9 - 3.9		1	Less than or equal to calculated value using: $e^{(0.9543(\ln+1.465))}$
Iron (µg/L)	996	882 - 1,110	161	2	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		1	Less than or equal to calculated value using: $e^{(1.273(\ln+4.705))}$
Zinc (µg/L)	6	6 - 6		1	Less than or equal to calculated value using: $e^{(0.8473(\ln+0.7614))}$

Table 6. Summary of Water Quality Parameters Collected by Grab Sampling at Station USSO for the Period from May 1998 through October 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
<b>Physical</b>					
Water Temperature (°C)	28.8	27.1 - 30.3	0.9	12	Not Applicable
Specific Conductance (µmhos/cm)	537	462 - 618	46	12	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	6.5	3 - 10	4.9	2	Not Applicable
Turbidity (NTU)	4.1	1.0 - 16.6	4.5	10	Less than or equal to 25 NTU above background
Dissolved Oxygen (mg/L)	3.9	1.5 - 6.0	1.2	12	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	49.4	18.9 - 73.5	15.2	12	Not Applicable
Water pH	7.2	6.7 - 7.5	0.3	12	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	109	74 - 140	24	10	Not Applicable
Total Hardness (mg/L)	226	219 - 232	9	2	Not Applicable
<b>Major Ions</b>					
Calcium (mg/L)	82.9	80.4 - 85.3	3.5	2	Not Applicable
Sodium (mg/L)	25.8	24.9 - 26.7	1.3	2	Not Applicable
Potassium (mg/L)	5.4	5.3 - 5.6	0.2	2	Not Applicable
Magnesium (mg/L)	4.5	4.4 - 4.6	0.1	2	Not Applicable
Total Alkalinity (mg/L)	186.7	148.2 - 224.4	22.9	10	Not less than 20 mg/L
Sulfate (mg/L)	21.1	18.7 - 23.6	3.4	2	Not Applicable
Chloride (mg/L)	38.7	33.5 - 50.4	5.2	10	Not greater than 10% of background
<b>Nutrients</b>					
Ammonium (mg/L)	0.074	<0.009 - 0.165	0.059	12	Not Applicable
Nitrate+nitrite (mg/L)	0.023	0.005 - 0.148	0.042	11	Not Applicable
Total Nitrogen (mg/L)	1.62	1.33 - 2.27	0.26	12	Not Applicable
Orthophosphate (mg/L)	0.077	0.006 - 0.174	0.050	10	Not Applicable
Total Phosphorus (mg/L)	0.106	0.033 - 0.227	0.057	14	Not Applicable
Silica (mg/L)	10.4	9.6 - 11.3	1.2	2	Not Applicable
<b>Trace Elements</b>					
Arsenic (µg/L)	<1.5	<1.5 - <1.5		1	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.3	<0.3 - <0.3		1	Less than or equal to calculated value using: $e^{(0.7852(n-1)-3.49)}$
Copper (µg/L)	<1.2	<1.2 - <1.2		1	Less than or equal to calculated value using: $e^{(0.8542(n-1)-1.485)}$
Iron (µg/L)	248	159 - 337	126	2	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		1	Less than or equal to calculated value using: $e^{(1.273(n-1)-4.705)}$
Zinc (µg/L)	<4	<4 - <4		1	Less than or equal to calculated value using: $e^{(0.8473(n-1)-0.7814)}$

Table 7. Summary of Water Quality Parameters Collected by Grab Sampling at Station S140 for the Period from May 1998 through October 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
<b>Physical</b>					
Water Temperature (°C)	29.3	26.6 - 31.0	1.3	8	Not Applicable
Specific Conductance (µmhos/cm)	454	353 - 515	58	8	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	<3	<3 - <3		2	Not Applicable
Turbidity (NTU)	1.7	0.8 - 2.4	0.6	8	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	1.9	0.8 - 5.7	1.6	8	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	24.6	10.0 - 71.6	20.2	8	Not Applicable
Water pH	7.4	7.2 - 7.7	0.2	8	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	88	54 - 124	23	8	Not Applicable
Total Hardness (mg/L)	190	177 - 202	18	2	Not Applicable
<b>Major Ions</b>					
Calcium (mg/L)	68.6	64.7 - 72.4	5.4	2	Not Applicable
Sodium (mg/L)	22.4	18.1 - 26.7	6.1	2	Not Applicable
Potassium (mg/L)	2.9	2.2 - 3.7	1.1	2	Not Applicable
Magnesium (mg/L)	4.5	3.8 - 5.2	1.0	2	Not Applicable
Total Alkalinity (mg/L)	170.6	139.7 - 190.3	16.4	8	Not less than 20 mg/L
Sulfate (mg/L)	11.3	5.8 - 16.7	7.7	2	Not Applicable
Chloride (mg/L)	29.9	17.8 - 44.3	9.6	8	Not greater than 10% of background
<b>Nutrients</b>					
Ammonium (mg/L)	0.068	<0.009 - 0.108	0.038	8	Not Applicable
Nitrate+nitrite (mg/L)	0.021	<0.004 - 0.041	0.015	8	Not Applicable
Total Nitrogen (mg/L)	1.41	1.08 - 1.61	0.16	8	Not Applicable
Orthophosphate (mg/L)	0.028	0.005 - 0.066	0.019	8	Not Applicable
Total Phosphorus (mg/L)	0.055	0.030 - 0.077	0.016	8	Not Applicable
Silica (mg/L)	10.0	9.4 - 10.5	0.8	2	Not Applicable
<b>Trace Elements</b>					
Arsenic (µg/L)	<1.5	<1.5 - <1.5		1	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.3	<0.3 - <0.3		1	Less than or equal to calculated value using: $e^{(0.7052(\ln(1)-3.44))}$
Copper (µg/L)	<1.2	<1.2 - <1.2		1	Less than or equal to calculated value using: $e^{(0.0543(\ln(1)-1.465))}$
Iron (µg/L)	258	213 - 302	63	2	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		1	Less than or equal to calculated value using: $e^{(1.272(\ln(1)-4.705))}$
Zinc (µg/L)	8	8 - 8		1	Less than or equal to calculated value using: $e^{(0.0472(\ln(1)-0.7014))}$

Table 8. Summary of Water Quality Parameters Collected by Grab Sampling at Station WWEIR for the Period from May 1998 through October 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
<b>Physical</b>					
Water Temperature (°C)	29.1	25.2 - 33.2	2.4	12	Not Applicable
Specific Conductance (µmhos/cm)	632	459 - 738	77	12	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)		-		0	Not Applicable
Turbidity (NTU)		-		0	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	2.8	1.2 - 4.2	1.1	12	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	34.8	14.6 - 55.3	14.0	12	Not Applicable
Water pH	7.2	6.6 - 7.7	0.4	12	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)		-		0	Not Applicable
Total Hardness (mg/L)		-		0	Not Applicable
<b>Major Ions</b>					
Calcium (mg/L)		-		0	Not Applicable
Sodium (mg/L)		-		0	Not Applicable
Potassium (mg/L)		-		0	Not Applicable
Magnesium (mg/L)		-		0	Not Applicable
Total Alkalinity (mg/L)		-		0	Not less than 20 mg/L
Sulfate (mg/L)		-		0	Not Applicable
Chloride (mg/L)		-		0	Not greater than 10% of background
<b>Nutrients</b>					
Ammonium (mg N/L)		-		0	Not Applicable
Nitrate+nitrite (mg N/L)		-		0	Not Applicable
Total Nitrogen (mg/L)	1.94	1.94 - 1.94		1	Not Applicable
Orthophosphate (mg/L)		-		0	Not Applicable
Total Phosphorus (mg/L)	0.045	0.015 - 0.088	0.020	26	Not Applicable
Silica (mg/L)		-		0	Not Applicable
<b>Trace Elements</b>					
Arsenic (µg/L)		-		0	Less than or equal to 50 µg/L
Cadmium (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.7892(n-1)-3.49)}$
Copper (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8545(n-1)-1.405)}$
Iron (µg/L)		-		0	Less than or equal to 1,000 µg/L
Lead (µg/L)		-		0	Less than or equal to calculated value using: $e^{(12.73(n-1)+4.705)}$
Zinc (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8473(n-1)-0.7814)}$



Table 9. Summary of Water Quality Parameters Collected by Grab Sampling at Station NFEED for the Period from May 1998 through October 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
<b>Physical</b>					
Water Temperature (°C)	30.0	25.6 - 32.7	1.7	26	Not Applicable
Specific Conductance (µmhos/cm)	473	424 - 517	26	26	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)		-		0	Not Applicable
Turbidity (NTU)		-		0	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	4.6	1.0 - 8.4	1.8	26	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	58.7	13.1 - 111.0	23.8	26	Not Applicable
Water pH	7.4	6.5 - 7.9	0.3	26	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)		-		0	Not Applicable
Total Hardness (mg/L)		-		0	Not Applicable
<b>Major Ions</b>					
Calcium (mg/L)		-		0	Not Applicable
Sodium (mg/L)		-		0	Not Applicable
Potassium (mg/L)		-		0	Not Applicable
Magnesium (mg/L)		-		0	Not Applicable
Total Alkalinity (mg/L)		-		0	Not less than 20 mg/L
Sulfate (mg/L)		-		0	Not Applicable
Chloride (mg/L)		-		0	Not greater than 10% of background
<b>Nutrients</b>					
Ammonium (mg/L)		-		0	Not Applicable
Nitrate+nitrite (mg/L)		-		0	Not Applicable
Total Nitrogen (mg/L)		-		0	Not Applicable
Orthophosphate (mg/L)		-		0	Not Applicable
Total Phosphorus (mg/L)	0.083	0.031 - 0.194	0.051	26	Not Applicable
Silica (mg/L)		-		0	Not Applicable
<b>Trace Elements</b>					
Arsenic (µg/L)		-		0	Less than or equal to 50 µg/L
Cadmium (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.7822(\text{pH})-8.49)}$
Copper (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8545(\text{pH})-1.465)}$
Iron (µg/L)		-		0	Less than or equal to 1,000 µg/L
Lead (µg/L)		-		0	Less than or equal to calculated value using: $e^{(1.274(\text{pH})-4.705)}$
Zinc (µg/L)		-		0	Less than or equal to calculated value using: $e^{(0.8473(\text{pH})-0.7614)}$

Table 10. Summary of Water Quality Parameters Collected by Grab Sampling at Station S190 for the Period from May 1998 through October 1998.

Parameters	Mean	Range	Standard Deviation	Number of Samples	Criteria for Class III Predominantly Fresh Surface Waters, FAC 62-302
<b>Physical</b>					
Water Temperature (°C)	30.4	28.9 - 32.9	1.4	7	Not Applicable
Specific Conductance (µmhos/cm)	561	498 - 615	40	7	Not greater than 50% above background or 1,275 µmhos/cm
Total Suspended Solids (mg/L)	3.0	3 - 3	0.0	2	Not Applicable
Turbidity (NTU)	5.8	1.0 - 30.4	10.8	7	Less than or equal to 29 NTU above background
Dissolved Oxygen (mg/L)	4.2	2.7 - 6.9	1.5	7	Not be less than 5.0 mg/L
Dissolved Oxygen (% Saturation)	53.9	35.1 - 88.2	18.9	7	Not Applicable
Water pH	7.4	6.9 - 7.6	0.2	7	Not less than 6.0 or greater than 8.5 units
Apparent Color (PCU)	71	42 - 104	23	7	Not Applicable
Total Hardness (mg/L)	236	230 - 242	8	2	Not Applicable
<b>Major Ions</b>					
Calcium (mg/L)	82.9	81.7 - 84.1	1.7	2	Not Applicable
Sodium (mg/L)	30.3	27.3 - 33.2	4.2	2	Not Applicable
Potassium (mg/L)	2.8	2.5 - 3.1	0.4	2	Not Applicable
Magnesium (mg/L)	7.0	6.3 - 7.7	1.0	2	Not Applicable
Total Alkalinity (mg/L)	212.6	186.0 - 245.6	19.7	7	Not less than 20 mg/L
Sulfate (mg/L)	12.0	10.0 - 14.0	2.8	2	Not Applicable
Chloride (mg/L)	39.7	28.9 - 48.8	7.6	7	Not greater than 10% of background
<b>Nutrients</b>					
Ammonium (mg/L)	0.013	<0.009 - 0.036	0.010	7	Not Applicable
Nitrate+nitrite (mg/L)	0.048	0.005 - 0.226	0.081	7	Not Applicable
Total Nitrogen (mg/L)	1.47	1.09 - 2.63	0.54	7	Not Applicable
Orthophosphate (mg/L)	0.018	0.007 - 0.043	0.014	7	Not Applicable
Total Phosphorus (mg/L)	0.063	0.022 - 0.139	0.039	7	Not Applicable
Silica (mg/L)	11.3	10.3 - 12.4	1.5	2	Not Applicable
<b>Trace Elements</b>					
Arsenic (µg/L)	<1.5	<1.5 - <1.5		1	Less than or equal to 50 µg/L
Cadmium (µg/L)	<0.3	<0.3 - <0.3		1	Less than or equal to calculated value using: $e^{(0.7852(W)-3.42)}$
Copper (µg/L)	<1.2	<1.2 - <1.2		1	Less than or equal to calculated value using: $e^{(0.0545(W)-1.405)}$
Iron (µg/L)	150	50 - 249	141	2	Less than or equal to 1,000 µg/L
Lead (µg/L)	<0.8	<0.8 - <0.8		1	Less than or equal to calculated value using: $e^{(1.273(W)-4.705)}$
Zinc (µg/L)	<4	<4 - <4		1	Less than or equal to calculated value using: $e^{(0.0473(W)-0.7614)}$

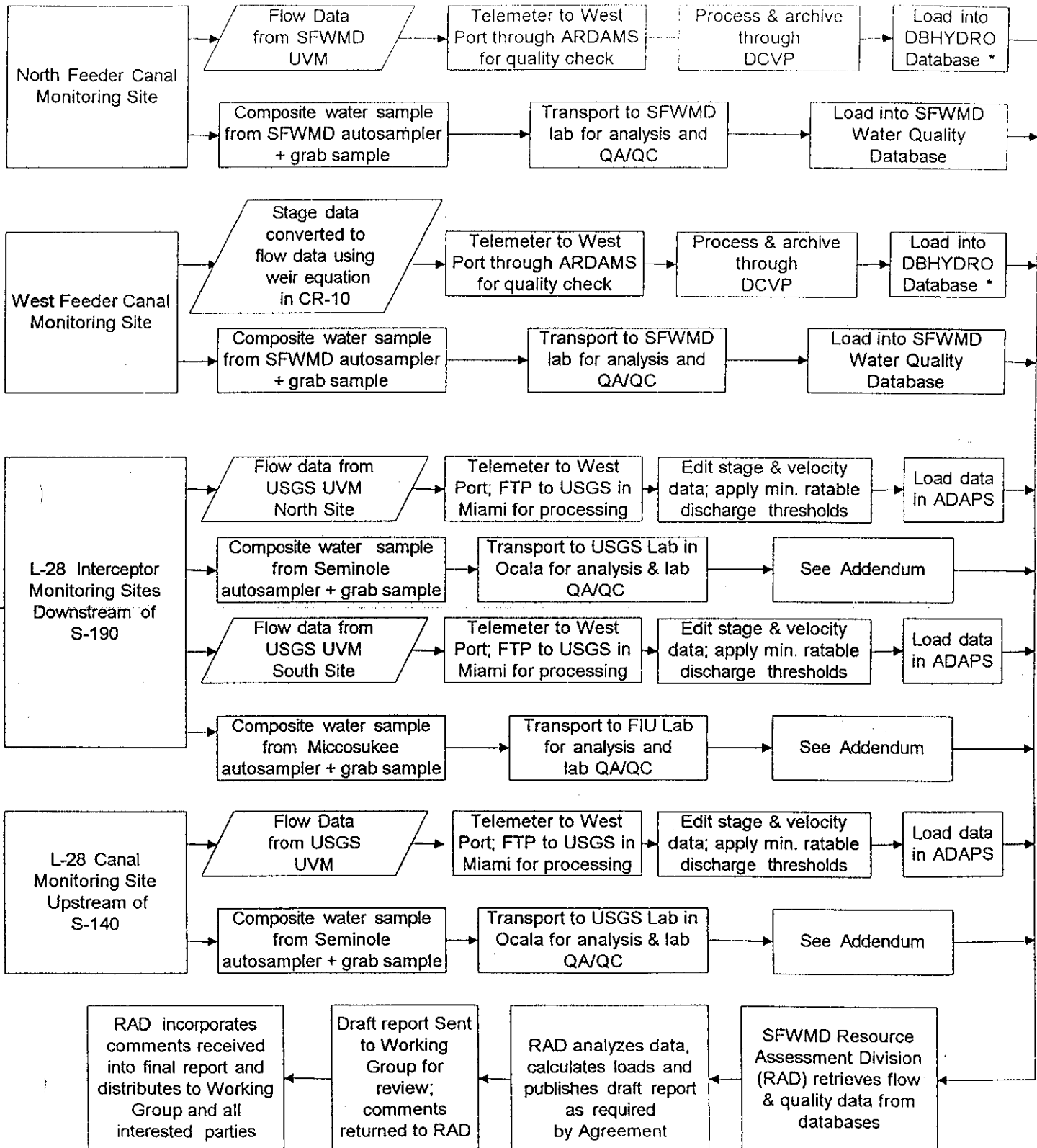
**Table 11. Trace metal concentrations above the method detection limit and compared with Class III Standard calculated using water hardness.**

Station Number	Date Collected	Total Copper (µg/L)		Total Zinc (µg/L)		Total Iron (µg/L)	
		Measured	Standard	Measured	Standard	Measured	Standard
L3BRS	16-Jul-98	3.9	<18.0	5.6	<160	882	<1,000
L3BRS	08-Oct-98	---	---	---	---	1,110	<1,000
S140	30-Jul-98	---	---	7.7	<192	213	<1,000
S140	08-Oct-98	---	---	---	---	302	<1,000
USSO	16-Jul-98	---	---	---	---	159	<1,000
USSO	08-Oct-98	---	---	---	---	337	<1,000

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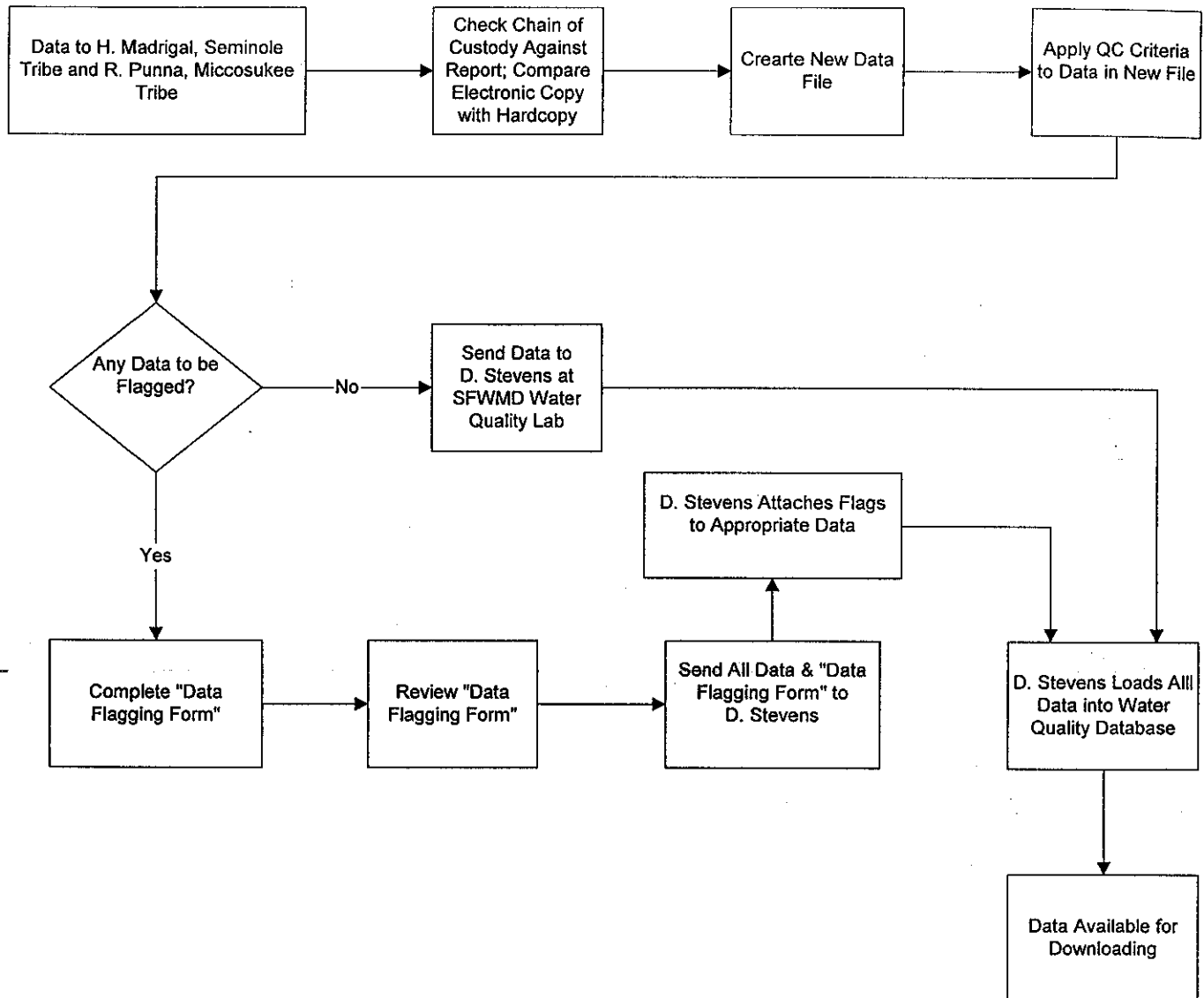
# APPENDIX I. Flow Chart for Water Flow and Water Quality Data Collected for the SFWMD/Seminole Cooperative Agreement

Updated 6/19/98

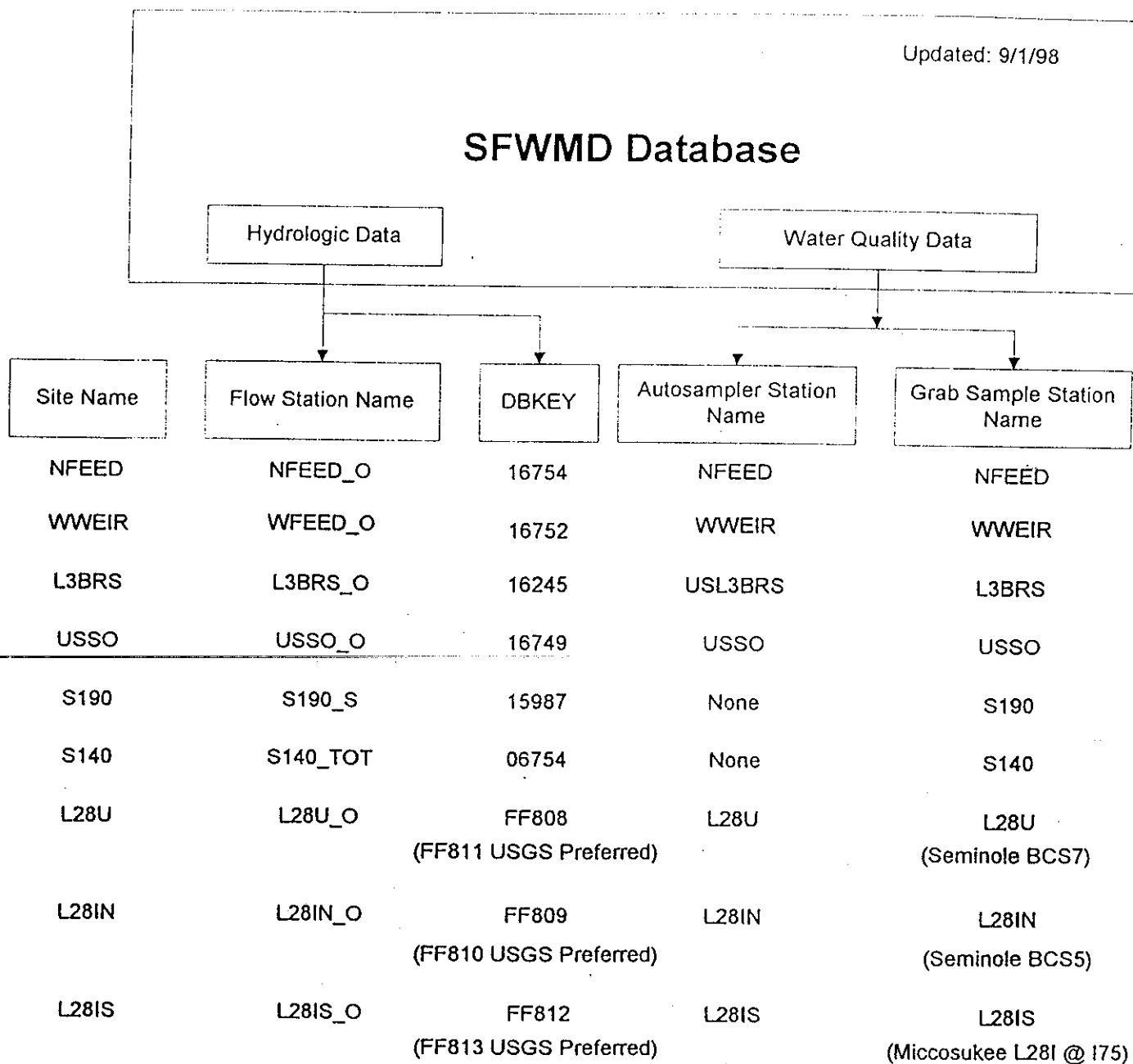


**Addendum to Appendix I. Flow Chart for Water Flow and Water Quality Data  
Collected for the Seminole/SFWMD Cooperative Agreement**

Updated 3/1/99



## APPENDIX II. SFWMD/Seminole Agreement Sampling Station Names



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**APPENDIX III. Total phosphorus concentration data for the period of  
May 1, 1998 through October 31, 1998.**

**For L3BRS and USL3BRS:**

**(1) Grab sample TP concentration.**

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
L3BRS	CAMB	19980521	0	0.045	60535	L10152-7	SFWMD
(USL3BRS	CAMB	19980521	0	0.061	60527	L10153-7	SFWMD)
L3BRS	CAMB	19980701	0	0.132	60604	L10409-7	SFWMD
(USL3BRS	CAMB	19980709	0	0.094	60634	L10446-7	SFWMD)
L3BRS	CAMB	19980716	0	0.192	60653	L10493-10	SFWMD
L3BRS	CAMB	19980812	0	0.204	60700	L10648-10	SFWMD
L3BRS	CAMB	19980827	0	0.194	60729	L10759-10	SFWMD
L3BRS	CAMB	19980909	0	0.156	60753	L10831-7	SFWMD
L3BRS	CAMB	19980930	0	0.166	60781	L10973-7	SFWMD
L3BRS	CAMB	19981008	0	0.161	60821	L11020-10	SFWMD
L3BRS	CAMB	19981022	0	0.083	60839	L11116-7	SFWMD

**(2) Auto-sampler flow proportional composite TP concentration.**

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
USL3BRS	CAMB	19980507	24	0.082	60512	L10061-6	SFWMD
USL3BRS	CAMB	19980514	24	0.076	60517	L10106-4	SFWMD
USL3BRS	CAMB	19980528	24	0.077	60546	L10200-4	SFWMD
USL3BRS	CAMB	19980603	24	0.042	60551	L10238-4	SFWMD
USL3BRS	CAMB	19980611	24	0.063	60572	L10287-4	SFWMD
USL3BRS	CAMB	19980618	24	0.049	60593	L10333-3	SFWMD
USL3BRS	CAMB	19980625	24	0.133	60615	L10378-4	SFWMD
USL3BRS	CAMB	19980702	24	0.143	60622	L10414-3	SFWMD
USL3BRS	CAMB	19980716	24	0.085	60641	L10492-6	SFWMD
<del>USL3BRS</del>	<del>CAMB</del>	<del>19980723</del>	<del>24</del>	<del>0.142</del>	<del>60738</del>	<del>L10532-6</del>	<del>SFWMD</del>
USL3BRS	CAMB	19980730	24	0.173	60675	L10575-6	SFWMD
USL3BRS	CAMB	19980813	24	0.208	60689	L10662-6	SFWMD
USL3BRS	CAMB	19980820	24	0.181	60709	L10720-5	SFWMD
USL3BRS	CAMB	19980827	24	0.213	60716	L10761-4	SFWMD
USL3BRS	CAMB	19980903	24	0.154	60745	L10805-6	SFWMD
USL3BRS	CAMB	19980910	24	0.152	60764	L10841-4	SFWMD
USL3BRS	CAMB	19980917	24	0.113	60773	L10892-6	SFWMD
USL3BRS	CAMB	19980922	24	0.192	60792	L10921-4	SFWMD
USL3BRS	CAMB	19981001	24	0.199	60801	L10980-4	SFWMD
USL3BRS	CAMB	19981008	24	0.132	60808	L11021-4	SFWMD
USL3BRS	CAMB	19981015	24	0.176	60831	L11071-6	SFWMD
USL3BRS	CAMB	19981022	24	0.122	60850	L11118-4	SFWMD
USL3BRS	CAMB	19981028	24	0.090	60859	L11155-6	SFWMD
USL3BRS	CAMB	19981104	24	0.078	60881	L11194-6	SFWMD

### APPENDIX III. (continued)

For USSO:

#### (1) Grab sample TP concentration.

USSO	CAMB	19980521	0	0.063	60536	L10152-8	SFWMD
USSO	CAMB	19980603	0	0.049	60553	L10238-6	SFWMD
USSO	CAMB	19980603	0	0.053	60559	L10234-5	SFWMD
USSO	CAMB	19980611	0	0.089	60576	L10287-8	SFWMD
USSO	CAMB	19980618	0	0.033	60591	L10333-1	SFWMD
USSO	CAMB	19980625	0	0.788*	60616	L10378-5	SFWMD
USSO	CAMB	19980701	0	0.227	60605	L10409-8	SFWMD
USSO	CAMB	19980702	0	0.193	60621	L10414-2	SFWMD
USSO	CAMB	19980716	0	0.077	60654	L10493-11	SFWMD
USSO	CAMB	19980805	0	0.059	60683	L10611-7	SFWMD
USSO	CAMB	19980812	0	0.145	60701	L10648-11	SFWMD
USSO	CAMB	19980827	0	0.120	60730	L10759-11	SFWMD
USSO	CAMB	19980909	0	0.090	60754	L10831-8	SFWMD
USSO	CAMB	19980930	0	0.089	60782	L10973-8	SFWMD
USSO	CAMB	19981008	0	0.174	60822	L11020-11	SFWMD
USSO	CAMB	19981022	0	0.075	60843	L11116-11	SFWMD

\* denotes a sample deemed to be an outlier and not included in the statistics or load calculation.

#### (2) Auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
USSO	CAMB	19980507	24	0.078	60513	L10061-7	SFWMD
USSO	CAMB	19980514	24	0.060	60518	L10106-5	SFWMD
USSO	CAMB	19980521	24	0.047	60528	L10153-8	SFWMD
USSO	CAMB	19980702	24	0.343	60620	L10414-1	SFWMD
USSO	CAMB	19980709	24	0.243	60635	L10446-8	SFWMD
USSO	CAMB	19980716	24	0.078	60642	L10492-7	SFWMD
USSO	CAMB	19980723	24	0.087	60739	L10532-7	SFWMD
USSO	CAMB	19980730	24	0.079	60676	L10575-7	SFWMD
USSO	CAMB	19980813	24	0.095	60690	L10662-7	SFWMD
USSO	CAMB	19980820	24	0.112	60712	L10720-8	SFWMD
USSO	CAMB	19980827	24	0.102	60713	L10761-1	SFWMD
USSO	CAMB	19980903	24	0.105	60746	L10805-7	SFWMD
USSO	CAMB	19980917	24	0.122	60774	L10892-7	SFWMD
USSO	CAMB	19980922	24	0.094	60789	L10921-1	SFWMD
USSO	CAMB	19981008	24	0.153	60805	L11021-1	SFWMD
USSO	CAMB	19981015	24	0.140	60830	L11071-5	SFWMD
USSO	CAMB	19981028	24	0.081	60856	L11155-3	SFWMD
USSO	CAMB	19981104	24	0.082	60882	L11194-7	SFWMD

### APPENDIX III. (continued)

For S140:

Grab sample TP concentration.

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
S140	CAMB	19980521	0	0.052	60542	L10152-14	SFWMD
S140	CAMB	19980701	0	0.054	60610	L10409-13	SFWMD
S140	CAMB	19980730	0	0.068	60669	L10570-4	SFWMD
S140	CAMB	19980827	0	0.077	60733	L10759-14	SFWMD
S140	CAMB	19980909	0	0.068	60760	L10831-14	SFWMD
S140	CAMB	19980930	0	0.036	60785	L10973-11	SFWMD
S140	CAMB	19981008	0	0.051	60825	L11020-14	SFWMD
S140	CAMB	19981022	0	0.030	60846	L11116-14	SFWMD

# APPENDIX III. (continued)

## For WEIR:

### (1) Grab sample TP concentration.

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
WWEIR	SEMI	19980507	0	0.044	1423	L10062-5	SFWMD
WWEIR	SEMI	19980514	0	0.034	1429	L10107-5	SFWMD
WWEIR	SEMI	19980521	0	0.055	1437	L10154-7	SFWMD
WWEIR	SEMI	19980528	0	0.073	1446	L10201-8	SFWMD
WWEIR	SEMI	19980603	0	0.044	1453	L10239-7	SFWMD
WWEIR	SEMI	19980611	0	0.039	1459	L10288-5	SFWMD
WWEIR	SEMI	19980618	0	0.050	1464	L10334-4	SFWMD
WWEIR	SEMI	19980625	0	0.055	1473	L10379-6	SFWMD
WWEIR	SEMI	19980702	0	0.052	1477	L10415-4	SFWMD
WWEIR	SEMI	19980709	0	0.052	1485	L10447-5	SFWMD
WWEIR	SEMI	19980716	0	0.047	1491	L10491-5	SFWMD
WWEIR	SEMI	19980723	0	0.020	1497	L10533-5	SFWMD
WWEIR	SEMI	19980730	0	0.020	1503	L10576-5	SFWMD
WWEIR	SEMI	19980805	0	0.016	1509	L10613-5	SFWMD
WWEIR	SEMI	19980813	0	0.015	1515	L10663-5	SFWMD
WWEIR	SEMI	19980820	0	0.028	1521	L10721-5	SFWMD
WWEIR	SEMI	19980827	0	0.050	1526	L10760-4	SFWMD
WWEIR	SEMI	19980903	0	0.044	1532	L10806-3	SFWMD
WWEIR	SEMI	19980910	0	0.028	1537	L10842-4	SFWMD
WWEIR	SEMI	19980917	0	0.022	1541	L10891-4	SFWMD
WWEIR	SEMI	19980922	0	0.085	1543	L10920-2	SFWMD
WWEIR	SEMI	19981001	0	0.088	1550	L10981-4	SFWMD
WWEIR	SEMI	19981008	0	0.062	1555	L11022-5	SFWMD
WWEIR	SEMI	19981015	0	0.071	1557	L11070-2	SFWMD
WWEIR	SEMI	19981022	0	0.050	1561	L11117-2	SFWMD
WWEIR	SEMI	19981028	0	0.034	1565	L11156-2	SFWMD

### (2) Auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
WWEIR	SEMI	19980723	24	0.033	1498	L10533-6	SFWMD
WWEIR	SEMI	19980730	24	0.040	1504	L10576-6	SFWMD
WWEIR	SEMI	19980820	24	0.019	1522	L10721-6	SFWMD
WWEIR	SEMI	19980827	24	0.040	1527	L10760-5	SFWMD
WWEIR	SEMI	19980903	24	0.043	1533	L10806-4	SFWMD
WWEIR	SEMI	19980910	24	0.050	1536	L10842-3	SFWMD
WWEIR	SEMI	19980917	24	0.030	1540	L10891-3	SFWMD
WWEIR	SEMI	19980922	24	0.052	1544	L10920-3	SFWMD
WWEIR	SEMI	19981001	24	0.098	1549	L10981-3	SFWMD
WWEIR	SEMI	19981008	24	0.078	1554	L11022-4	SFWMD
WWEIR	SEMI	19981015	24	0.058	1556	L11070-1	SFWMD
WWEIR	SEMI	19981022	24	0.041	1560	L11117-1	SFWMD
WWEIR	SEMI	19981028	24	0.042	1564	L11156-1	SFWMD
WWEIR	SEMI	19981104	24	0.042	1570	L11195-3	SFWMD

### APPENDIX III. (continued)

For NFEED:

#### (1) Grab sample TP concentration.

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
NFEED	SEMI	19980507	0	0.054	1420	L10062-2	SFWMD
NFEED	SEMI	19980514	0	0.067	1426	L10107-2	SFWMD
NFEED	SEMI	19980521	0	0.051	1434	L10154-4	SFWMD
NFEED	SEMI	19980528	0	0.064	1442	L10201-4	SFWMD
NFEED	SEMI	19980603	0	0.041	1450	L10239-4	SFWMD
NFEED	SEMI	19980611	0	0.031	1456	L10288-2	SFWMD
NFEED	SEMI	19980618	0	0.044	1467	L10334-7	SFWMD
NFEED	SEMI	19980625	0	0.043	1469	L10379-2	SFWMD
NFEED	SEMI	19980702	0	0.044	1480	L10415-7	SFWMD
NFEED	SEMI	19980709	0	0.043	1482	L10447-2	SFWMD
NFEED	SEMI	19980716	0	0.042	1488	L10491-2	SFWMD
NFEED	SEMI	19980723	0	0.057	1494	L10533-2	SFWMD
NFEED	SEMI	19980730	0	0.050	1500	L10576-2	SFWMD
NFEED	SEMI	19980805	0	0.042	1506	L10613-2	SFWMD
NFEED	SEMI	19980813	0	0.035	1511	L10663-1	SFWMD
NFEED	SEMI	19980820	0	0.046	1518	L10721-2	SFWMD
NFEED	SEMI	19980827	0	0.194	1529	L10760-7	SFWMD
NFEED	SEMI	19980903	0	0.159	1531	L10806-2	SFWMD
NFEED	SEMI	19980910	0	0.149	1535	L10842-2	SFWMD
NFEED	SEMI	19980917	0	0.112	1539	L10891-2	SFWMD
NFEED	SEMI	19980922	0	0.102	1545	L10920-4	SFWMD
NFEED	SEMI	19981001	0	0.129	1548	L10981-2	SFWMD
NFEED	SEMI	19981008	0	0.163	1553	L11022-3	SFWMD
NFEED	SEMI	19981015	0	0.163	1559	L11070-4	SFWMD
NFEED	SEMI	19981022	0	0.139	1563	L11117-4	SFWMD
NFEED	SEMI	19981028	0	0.095	1567	L11156-4	SFWMD

### APPENDIX III. (continued)

For NFEED:

(2) Auto-sampler flow proportional composite TP concentration.

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
NFEED	SEMI	19980507	24	0.068	1419	L10062-1	SFWMD
NFEED	SEMI	19980514	24	0.056	1425	L10107-1	SFWMD
NFEED	SEMI	19980521	24	0.062	1431	L10154-1	SFWMD
NFEED	SEMI	19980528	24	0.033	1439	L10201-1	SFWMD
NFEED	SEMI	19980603	24	0.050	1447	L10239-1	SFWMD
NFEED	SEMI	19980611	24	0.038	1455	L10288-1	SFWMD
NFEED	SEMI	19980618	24	0.041	1466	L10334-6	SFWMD
NFEED	SEMI	19980625	24	0.051	1468	L10379-1	SFWMD
NFEED	SEMI	19980702	24	0.060	1479	L10415-6	SFWMD
NFEED	SEMI	19980709	24	0.067	1481	L10447-1	SFWMD
NFEED	SEMI	19980716	24	0.061	1487	L10491-1	SFWMD
NFEED	SEMI	19980723	24	0.067	1493	L10533-1	SFWMD
NFEED	SEMI	19980730	24	0.056	1499	L10576-1	SFWMD
NFEED	SEMI	19980805	24	0.055	1505	L10613-1	SFWMD
NFEED	SEMI	19980813	24	0.045	1512	L10663-2	SFWMD
NFEED	SEMI	19980820	24	0.052	1517	L10721-1	SFWMD
NFEED	SEMI	19980827	24	0.187	1528	L10760-6	SFWMD
NFEED	SEMI	19980903	24	0.166	1530	L10806-1	SFWMD
NFEED	SEMI	19980910	24	0.153	1534	L10842-1	SFWMD
NFEED	SEMI	19980917	24	0.127	1538	L10891-1	SFWMD
NFEED	SEMI	19980922	24	0.117	1546	L10920-5	SFWMD
NFEED	SEMI	19981001	24	0.133	1547	L10981-1	SFWMD
NFEED	SEMI	19981008	24	0.116	1552	L11022-2	SFWMD
NFEED	SEMI	19981015	24	0.143	1558	L11070-3	SFWMD
NFEED	SEMI	19981022	24	0.143	1562	L11117-3	SFWMD
NFEED	SEMI	19981028	24	0.104	1566	L11156-3	SFWMD
NFEED	SEMI	19981104	24	0.091	1568	L11195-1	SFWMD

**APPENDIX III. (continued)**

**For S190:**

**Grab sample TP concentration.**

Station	Project	Date	Type	TP (mg/L)	Sample_ID	LIMS no.	Source
S190	CAMB	19980521	0	0.139	60537	L10152-9	SFWMD
S190	CAMB	19980701	0	0.030	60609	L10409-12	SFWMD
S190	CAMB	19980730	0	0.022	60666	L10570-1	SFWMD
S190	CAMB	19980827	0	0.062	60731	L10759-12	SFWMD
S190	CAMB	19980909	0	0.047	60755	L10831-9	SFWMD
S190	CAMB	19980930	0	0.056	60783	L10973-9	SFWMD
S190	CAMB	19981008	0	0.085	60823	L11020-12	SFWMD

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## **Addendum**

### **L28IS Nutrient, Water Quality and Flow Data Summary for the Period of March 1, 1998 through September 30, 1998**

Figure A1. L28IS TP Load, Flow and TP Concentration for the Period of  
March 1, 1998 through September 30, 1998

Table A1. L28IS Total Phosphorus (TP) Concentration and Water Flow  
Data Summary for the Period of March 1, 1998 through  
September 30, 1998

Table A2. L28IS Monthly Total Phosphorus (TP) Load and Flow Summary  
for the Period of March 1998 through September 1998

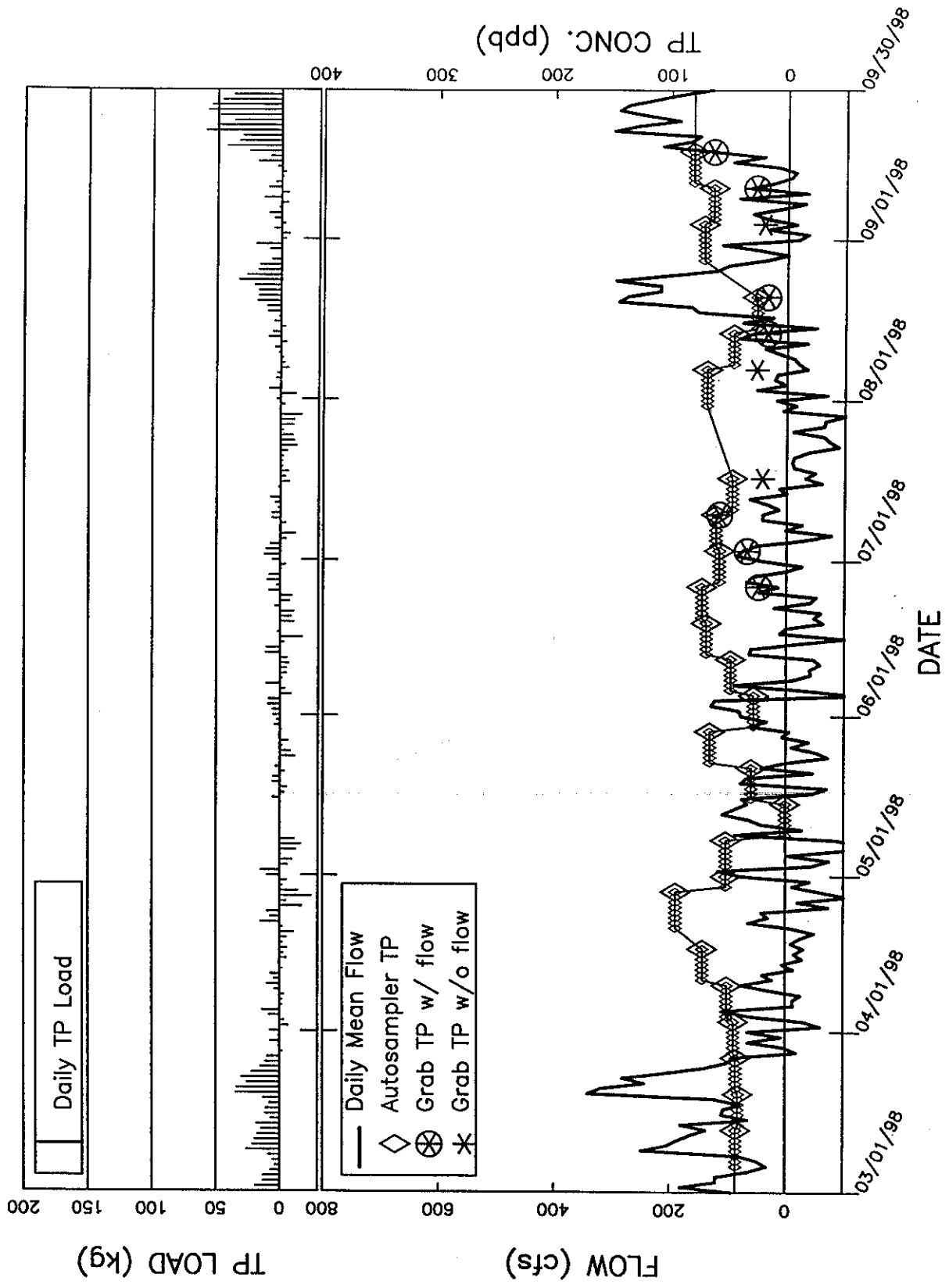
Table A3. L28IS TP Concentration Data for the Period of March 1998  
through September 1998

Table A4. Water Quality Data for Grab Samples Collected at Station L28IS  
from March 1998 through September 1998

Table A5. Water Quality Data Collected Using Auto-Samplers at Station  
L28IS from March 1998 through September 1998

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Figure A1. L28IS TP Load, Flow and TP Concentration



**Table A1. Seminole/SFWMD Agreement total phosphorus (TP) data and water flow data summary for the period of March 1, 1998 through September 30, 1998.**

**For L28IS:**

term	clab	glab	qlab	dbkey	qsign	itype	ldsign	iyndcomp
L28IS	L28IS	<u>L28I@175</u>	L28IS_O	FF812	1	1	0	19980306

Grab sample n = 10

first datum : 1998/06/26

last datum : 1998/09/18

average value (arithmetic mean) = 30.8 ppb

range = 17 to 64ppb

Grab sample w/ +flow = 7

first datum : 1998/06/26

last datum : 1998/09/18

average value (arithmetic mean) = 34.4 ppb

range = 17 to 64 ppb

flow weighted mean for data w/ +flow = 31.8 ppb

regression: TP conc (ppb) = 37.9384 - 0.0379 \* flow (cfs)

load ratio of comp:grab = 1.54347 (common days = 7)

Autosampler (flow proportional composite) n = 25

first datum : 1998/03/13

last datum : 1998/09/18

average value (arithmetic mean) = 53.3 ppb

range = 1 to 95 ppb

flow weighted mean for data = 43.6 ppb

regression: TP conc (ppb) = 62.1999 - 0.1849 \* flow (cfs)

note: composite sample missing after 1998/07/17 for 14 days

Flow data from 1998/03/01 to 1998/09/30

number of no flow days = 0

number of positive flow days = 131

total positive flow = 12883.279 cfs-d

number of negative flow days = 83

total negative flow = 3424.500 cfs-d

no missing flow data

**Table A2. L28IS total phosphorus (TP) load calculation monthly summary  
for the period of March 1, 1998 through September 30, 1998.**

**Note:** Flow is in million cubic meters and in (thousand acre-feet).

Flow-weighted mean concentration for each month is calculated by dividing  
monthly load with monthly total flow.

**For L28IS :**

Station	month	days	flow	load(Kg)	fwmc(ppb)	flow_negative	load_neg.
L28IS	1998/03	31	10.166 ( 8.242)	432.579	42.552	-0.044 ( -0.036)	-1.982
L28IS	1998/04	30	1.337 ( 1.084)	85.360	63.865	-1.555 ( -1.261)	-118.803
L28IS	1998/05	31	2.486 ( 2.016)	52.477	21.107	-1.957 ( -1.586)	-95.706
L28IS	1998/06	30	2.068 ( 1.677)	94.438	45.667	-1.862 ( -1.509)	-105.332
L28IS	1998/07	31	1.127 ( 0.914)	63.164	56.037	-2.040 ( -1.654)	-118.965
L28IS	1998/08	31	6.460 ( 5.238)	268.659	41.585	-0.548 ( -0.444)	-28.658
L28IS	1998/09	30	7.876 ( 6.385)	626.751	79.582	-0.373 ( -0.302)	-26.000

**Table A3. Total phosphorus concentration data for the period of March 1, 1998 through September 30, 1998.**

**For L28IS :**

**(1) Grab sample TP concentration.**

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	Source
L28IS	MICC	19980626	0	0.024	00047	SERP, FIU MICC
L28IS	MICC	19980703	0	0.034	00050	SERP, FIU MICC
L28IS	MICC	19980710	0	0.058	00053	SERP, FIU MICC
L28IS	MICC	19980717	0	0.021	00056	SERP, FIU MICC
L28IS	MICC	19980807	0	0.026	00059	SERP, FIU MICC
L28IS	MICC	19980814	0	0.017	00062	SERP, FIU MICC
L28IS	MICC	19980821	0	0.017	00065	SERP, FIU MICC
L28IS	MICC	19980904	0	0.020	00068	SERP, FIU MICC
L28IS	MICC	19980911	0	0.027	00071	SERP, FIU MICC
L28IS	MICC	19980918	0	0.064	00074	SERP, FIU MICC

**(2) Auto-sampler Flow-Proportional Composite TP concentration.**

Station	Project	Date	Sample_type	TP (mg/L)	Sample_ID	Source
L28IS	MICC	19980313	24	0.043	00003	SERP, FIU MICC
L28IS	MICC	19980320	24	0.041	00006	SERP, FIU MICC
L28IS	MICC	19980327	24	0.043	00009	SERP, FIU MICC
L28IS	MICC	19980403	24	0.045	00012	SERP, FIU MICC
L28IS	MICC	19980410	24	0.051	00015	SERP, FIU MICC
L28IS	MICC	19980417	24	0.072	00018	SERP, FIU MICC
L28IS	MICC	19980428	24	0.095	00021	SERP, FIU MICC
L28IS	MICC	19980501	24	0.052	00024	SERP, FIU MICC
L28IS	MICC	19980508	24	0.052	00027	SERP, FIU MICC
L28IS	MICC	19980515	24	0.001	00030	SERP, FIU MICC
L28IS	MICC	19980522	24	0.030	00033	SERP, FIU MICC
L28IS	MICC	19980529	24	0.066	00036	SERP, FIU MICC
L28IS	MICC	19980605	24	0.028	00039	SERP, FIU MICC
L28IS	MICC	19980612	24	0.048	00042	SERP, FIU MICC
L28IS	MICC	19980619	24	0.069	00045	SERP, FIU MICC
L28IS	MICC	19980626	24	0.073	00048	SERP, FIU MICC
L28IS	MICC	19980703	24	0.058	00051	SERP, FIU MICC
L28IS	MICC	19980710	24	0.061	00054	SERP, FIU MICC
L28IS	MICC	19980717	24	0.047	00057	SERP, FIU MICC
L28IS	MICC	19980807	24	0.069	00060	SERP, FIU MICC
L28IS	MICC	19980814	24	0.046	00063	SERP, FIU MICC
L28IS	MICC	19980821	24	0.026	00066	SERP, FIU MICC
L28IS	MICC	19980904	24	0.072	00069	SERP, FIU MICC
L28IS	MICC	19980911	24	0.064	00072	SERP, FIU MICC
L28IS	MICC	19980918	24	0.081	00075	SERP, FIU MICC

Table A4. Water Quality Data for Grab Samples Collected at Station L28IS from March 1998 through September 1998.

Date Sampled	Water Temperature (°C)	Specific Conductance (µmhos/cm)	pH	Dissolved Ammonia (mg N/L)	Dissolved Nitrite (mg N/L)	Dissolved Nitrate (mg N/L)	Total Nitrogen (mg/L)	Dissolved Orthophosphate (mg P/L)	Total Phosphorus (mg/L)	Total Organic Carbon (mg/L)
03/13/1998	27.6	594	7.2	0.006	0.001			0.004		
03/20/1998	28.6	542	7.4	0.045	0.002	0.011		0.009		
03/27/1998	27.4	563	7.5		0.001			0.002		
04/03/1998	27.7	590	7.3	0.010	0.002			0.002		
04/10/1998	28.1	576	6.8	0.004	0.002	0.001				
04/17/1998	32.4	596	7.4	0.007	0.001			0.002		
04/28/1998	24.9	555	7.2	0.003	0.001			0.002		
05/01/1998	27.0	589	7.8	0.008	0.001			0.002		
05/08/1998	29.1	586	7.1	0.038	0.002			0.002		
05/15/1998	30.9	562	6.9	0.042	0.007	0.005		0.003		
05/22/1998	31.4	576	7.4	0.061	0.005	0.007		0.003		
05/29/1998	31.8	582	7.6	0.055	0.002	0.002		0.004		
06/05/1998	32.8	589	7.1	0.017	0.002			0.009		
06/12/1998	32.4	587	7.3	0.024	0.002			0.003		
06/19/1998	33.3	598	7.5	0.046	0.003	0.006		0.002		
06/26/1998	31.4	564	7.4	0.026	0.002		1.099		0.024	17.69
07/03/1998	29.6	542	7.4	0.084	0.007		1.101	0.008	0.034	18.76
07/10/1998	32.9	525	7.5	0.245	0.003	0.006	1.572	0.004	0.058	19.83
07/17/1998	32.5	460	7.3	0.051	0.002		1.213	0.002	0.021	17.42
08/07/1998	31.7	457	7.2	0.028	0.003	0.011	1.019	0.003	0.026	16.44
08/14/1998	31.6	584	7.4	0.075	0.003	0.001	1.031	0.008	0.017	14.87
08/21/1998	30.3	533	7.2	0.079	0.003	0.010	0.997	0.001	0.017	14.44
09/04/1998	32.2	580	7.8	0.128	0.002	0.012	1.057	0.008	0.020	14.44
09/11/1998	30.4	569	7.1	0.041	0.003	0.008	0.836	0.014	0.027	18.94
09/18/1998	28.5	528	7.4	0.073	0.003	0.004	1.091	0.014	0.064	18.75
Mean	30.3	561	7.3	0.050	0.003	0.006	1.102	0.005	0.031	17.16
Standard Deviation	2.3	38	0.2	0.052	0.002	0.004	0.191	0.004	0.017	2.01
Median	30.9	576	7.4	0.042	0.002	0.006	1.074	0.003	0.025	17.56
Minimum	24.9	457	6.8	0.003	0.001	0.001	0.836	0.001	0.017	14.44
Maximum	33.3	598	7.8	0.245	0.007	0.012	1.572	0.014	0.064	19.83
No. of Observations	25	25	25	24	25	13	10	23	10	10

**Table A5. Water Quality Data Collected Using Autosamplers  
at Station L281S from March 1998 through  
September 1998.**

Date Sampled	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Total Organic Carbon (mg/L)
03/13/1998	0.913	0.043	18.31
03/20/1998	0.938	0.041	18.37
03/27/1998	0.923	0.043	18.84
04/03/1998	0.988	0.045	20.14
04/10/1998	0.922	0.051	20.34
04/17/1998	0.844	0.072	21.16
04/28/1998	0.895	0.095	22.65
05/01/1998	1.099	0.052	26.50
05/08/1998	1.077	0.052	21.18
05/15/1998	1.026	0.001	43.16
05/22/1998	1.154	0.030	22.89
05/29/1998	1.180	0.066	20.08
06/05/1998	0.989	0.028	18.37
06/12/1998	1.047	0.048	20.00
06/19/1998	1.189	0.069	20.27
06/26/1998	1.100	0.073	
07/03/1998	0.957	0.058	
07/10/1998	0.572	0.061	
07/17/1998	1.762	0.047	
08/07/1998	1.173	0.069	
08/14/1998	1.016	0.046	
08/21/1998	0.730	0.026	
09/04/1998	0.970	0.072	
09/11/1998	1.183	0.064	
09/18/1998	1.078	0.081	
Mean	1.029	0.053	22.15
Standard Deviation	0.211	0.020	6.19
Median	1.016	0.052	20.27
Minimum	0.572	0.001	18.31
Maximum	1.762	0.095	43.16
No. of Observations	25	25	15

